PENNEAST PIPELINE PROJECT

Draft Environmental Impact Statement

Volume I

PennEast Pipeline Company, LLC

Docket No. CP15-558-000

FERC\EIS: 0271D

Federal Energy Regulatory Commission
Office of Energy Projects
Washington, DC 20426

Cooperating Agencies

US Army Corps of Engineers

United States Department of Agriculture
Natural Resources Conservation Service

July 2016

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FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

In Reply Refer To:
OEP/DG2E/Gas 2
PennEast Pipeline Company, LLC
Docket No. CP15-558-000

FERC/EIS-0271D

TO THE PARTY ADDRESSED:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has prepared a draft environmental impact statement (EIS) for the PennEast Pipeline Project (Project), proposed by PennEast Pipeline Company, LLC (PennEast) in the above-referenced docket. PennEast requests authorization to construct and operate the Project for the purpose of providing about 1.1 million dekatherms per day (MMDth/d) of year-round natural gas transportation service from northern Pennsylvania to markets in eastern and southeastern Pennsylvania, New Jersey, and surrounding states.

The draft EIS assesses the potential environmental effects of the construction and operation of the Project in accordance with the requirements of the National Environmental Policy Act. The FERC staff concludes that approval of the Project would result in some adverse environmental impacts; however, most of these impacts would be reduced to less-than-significant levels with the implementation of PennEast's proposed mitigation and the additional recommendations in the draft EIS.

The U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and U.S. Department of Agriculture Natural Resources Conservation Service participated as cooperating agencies in the preparation of the EIS. Cooperating agencies have jurisdiction by law or special expertise with respect to resources potentially affected by the proposal and participate in the National Environmental Policy Act analysis. Although these agencies provided input to the conclusions and recommendations presented in the draft EIS, the agencies will present their own conclusions and recommendations in any respective record of decision or determination for the Project.

The draft EIS addresses the potential environmental effects of the construction and operation of about 118.8 miles of natural gas pipeline and associated equipment and facilities in Pennsylvania and New Jersey. The 118.8 miles would consist of the following facilities:

- 115.1 miles of new 36-inch-diameter pipeline extending from Luzerne County, Pennsylvania to Mercer County, New Jersey;
- the 2.1-mile Hellertown Lateral consisting of 24-inch-diameter pipe in Northampton County, Pennsylvania;
- the 0.1-mile Gilbert Lateral consisting of 12-inch-diameter pipe in Hunterdon County, New Jersey; and
- the 1.5-mile Lambertville Lateral consisting of 36-inch-diameter pipe in Hunterdon County, New Jersey.

In addition to the pipeline facilities, PennEast would construct a new 47,700 horsepower compressor station in Kidder Township, Carbon County, Pennsylvania. The Project would also include the construction of eight metering and regulating stations for the Project interconnects, eleven mainline valvess, and four pig launcher/receivers.

The FERC staff mailed copies of the draft EIS to federal, state, and local government representatives and agencies; elected officials; environmental and public interest groups; Native American tribes; potentially affected landowners and other interested individuals and groups; and newspapers and libraries in the Project area. Paper copy versions of this draft EIS were mailed to those specifically requesting them; all others received a CD version. In addition, the draft EIS is available for public viewing on the FERC's website (www.ferc.gov) using the eLibrary link. A limited number of copies are available for distribution and public inspection at:

Federal Energy Regulatory Commission
Public Reference Room
888 First Street NE, Room 2A
Washington, DC 20426
(202) 502-8371

Any person wishing to comment on the draft EIS may do so. To ensure consideration of your comments on the proposal in the final EIS, it is important that the Commission receive your comments on or before **September 5, 2016**.

For your convenience, there are four methods you can use to submit your comments to the Commission. In all instances, please reference the Project's docket number (CP15-558-000) with your submission. The Commission encourages electronic filing of comments and has expert staff available to assist you at (202) 502-8258 or efiling@ferc.gov.

1) You can file your comments electronically using the eComment feature on the Commission's website (www.ferc.gov) under the link to Documents and Filings. This is an easy method for submitting brief, text-only comments on a project.

2) You can file your comments electronically by using the eFiling feature on the Commission's website (www.ferc.gov) under the link to Documents and Filings. With eFiling, you can provide comments in a variety of formats by attaching them as a file with your submission. New eFiling users must first create an account by clicking on "eRegister." If you are filing a comment on a particular project, please select "Comment on a Filing" as the filing type.

3) You can file a paper copy of your comments by mailing them to the following address:

   Nathaniel J. Davis, Sr., Deputy Secretary
   Federal Energy Regulatory Commission
   888 First Street NE, Room 1A
   Washington, DC 20426

4) In lieu of sending written or electronic comments, the Commission invites you to attend one of the public comment meetings its staff will conduct in the Project area to receive comments on the draft EIS. We[1] encourage interested groups and individuals to attend and present oral comments on the draft EIS at any of the meeting locations.

   The dates and locations of the public comment meetings will be provided in a future notice. There will not be a formal presentation by Commission staff, but FERC staff will be available throughout the meetings to answer your questions about the environmental review process. The meetings will be scheduled from 6:00pm to 10:00pm. The primary goal will be to have your verbal environmental comments on the draft EIS documented in the public record.

[1] "We," "us," and "our" refer to the environmental staff of the FERC's Office of Energy Projects.

Verbal comments will be recorded by court reporter(s) and transcriptions will be placed into the docket for the Project and made available for public viewing on FERC's eLibrary system (see below for instructions on using eLibrary). If a significant number of people are interested in providing verbal comments, a time limit of 3 to 5 minutes may be implemented for each commenter. It is important to note that verbal comments hold the same weight as written or electronically submitted comments.

Any person seeking to become a party to the proceeding must file a motion to intervene pursuant to Rule 214 of the Commission's Rules of Practice and Procedures (Title 18 Code of Federal Regulations Part 385.214).[2] Only intervenors have the right to seek rehearing of the Commission's decision. The Commission grants affected landowners and others with environmental concerns intervenor status upon showing good cause by stating that they have a clear and direct interest in this proceeding that no other party can adequately represent. **Simply filing environmental comments will not give you intervenor status, but you do not need intervenor status to have your comments considered.**

Questions?

Additional information about the Project is available from the Commission's Office of External Affairs, at **(866) 208-FERC**, or on the FERC website (www.ferc.gov) using the eLibrary link. Click on the eLibrary link, click on "General Search," and enter the docket number excluding the last three digits in the Docket Number field (i.e., CP15-558). Be sure you have selected an appropriate date range. For assistance, please contact FERC Online Support at FercOnlineSupport@ferc.gov or toll free at (866) 208-3676; for TTY, contact (202) 502-8659. The eLibrary link also provides access to the texts of formal documents issued by the Commission, such as orders, notices, and rulemakings.

In addition, the Commission offers a free service called eSubscription that allows you to keep track of all formal issuances and submittals in specific dockets. This can reduce the amount of time you spend researching proceedings by automatically providing you with notification of these filings, document summaries, and direct links to the documents. Go to www.ferc.gov/docs-filing/esubscription.asp.

[2] See the previous discussion on the methods for filing comments.

EXECUTIVE SUMMARY

INTRODUCTION

On September 24, 2015, PennEast Pipeline Company, LLC (PennEast) filed an application with the Federal Energy Regulatory Commission (Commission or FERC) under section 7(c) of the Natural Gas Act and Parts 157 and 284 of the Commission's regulations. The application was assigned Docket No. CP15-558-000 and a Notice of Application was issued on October 8, 2015 and noticed in the Federal Register on October 15, 2015. PennEast is seeking a Certificate of Public Convenience and Necessity (Certificate) from the FERC to construct, operate, and maintain a new natural gas pipeline system, including pipeline facilities, a compressor station, metering and regulating stations, and appurtenant facilities in Pennsylvania and New Jersey, referred to as the PennEast Pipeline Project, or Project.

The purpose of this environmental impact statement (EIS) is to inform FERC decision-makers, the public, and the permitting agencies about the potential adverse and beneficial environmental impacts of the Project and its alternatives, and recommend mitigation measures that would reduce adverse impacts, to the extent practicable. We[3] prepared this EIS to assess the environmental impacts associated with construction and operation of the Project as required under the National Environmental Policy Act of 1969 (NEPA), as amended. Our analysis was based on information provided by PennEast and further developed from data requests; field investigations; scoping; literature research; contacts with or comments from federal, state, and local agencies; and comments from individual members of the public.

The FERC is the lead agency for the preparation of the EIS. The U.S. Army Corps of Engineers, U.S. Environmental Protection Agency (EPA), U.S. Fish and Wildlife Service (FWS), and U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) participated in the NEPA review as a cooperating agencies.[4]

PROPOSED ACTION

The Project includes about 118.8 miles of pipeline composed of the following facilities:

- 115.1 miles of new, 36-inch-diameter pipeline extending from Luzerne County, Pennsylvania to Mercer County, New Jersey;
- the 2.1-mile Hellertown Lateral consisting of 24-inch-diameter pipe in Northampton County, Pennsylvania;
- the 0.1-mile Gilbert Lateral consisting of 12-inch-diameter pipe in Hunterdon County, New Jersey; and
- the 1.5-mile Lambertville Lateral consisting of 36-inch-diameter pipe in Hunterdon County, New Jersey.

In addition to the pipeline facilities, PennEast would construct a new 47,700 horsepower compressor station in Kidder Township, Carbon County, Pennsylvania. The Project would also

[3] "We," "us," and "our" refer to the environmental staff of the FERC's Office of Energy Projects.
[4] A cooperating agency is an agency that has jurisdiction over all or part of a project area and must make a decision on a project, and/or an agency that provides special expertise with regard to environmental or other resources.

include the construction of eight metering and regulating stations for the Project interconnects, 11 mainline valve (MLV) sites, and four pig launcher/receiver sites.

Subject to the receipt of FERC authorization and all other applicable permits, authorizations, and approvals, PennEast anticipates starting construction as soon as possible to meet its projected in-service date of November 2017.

The Project would provide about 1.1 million dekatherms per day of year-round natural gas transportation service from northern Pennsylvania to markets in New Jersey, eastern and southeastern Pennsylvania, and surrounding states.

PUBLIC INVOLVEMENT

On October 10, 2014, the FERC staff began its pre-filing review of the Project and established pre-filing Docket No. PF15-1-000 to place information related to the Project into the public record. The U.S. Army Corps of Engineers agreed at that time to conduct its environmental review of the Project in conjunction with the Commission's environmental review process.

On January 13, 2015, FERC issued a *Notice of Intent to Prepare an Environmental Impact Statement for the Planned PennEast Pipeline Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Meetings*. On January 21, 2014, we issued a *Notice of Extension of Comment Period and Clarification of Location of Public Comment Meetings for the PennEast Pipeline Project*. Public scoping meetings were held from February 10-12 and 25-26, 2015 in Bethlehem, Northampton County, Pennsylvania; Jim Thorpe, Carbon County, Pennsylvania; Wilkes-Barre, Luzerne County, Pennsylvania; Trenton, Mercer County, New Jersey; and Hampton, Hunterdon County, New Jersey. FERC sent an additional scoping letter on August 19, 2015 to landowners affected by the significant route modifications and opened an additional 30-day comment period.

Substantive environmental issues identified through this public review process are addressed in this EIS. The transcripts of the public scoping meetings and all written comments are part of the FERC's public record for the Project and are available for viewing using the appropriate docket number.

ENVIRONMENTAL IMPACTS AND MITIGATION

We evaluated the potential impacts of construction and operation of the Project on geology; soils; water resources; wetlands; aquatic resources; vegetation and wildlife; threatened, endangered, and special status species; land use, recreation, and visual resources; socioeconomics; cultural resources; air quality and noise; reliability and safety; and cumulative impacts. In Section 3 of this EIS, we summarized the evaluation of alternatives to the Project, including the no-action alternative, system alternatives, major route alternatives, minor route variations, and an alternative compressor station location. Where necessary, we are recommending additional mitigation measures to minimize or avoid these impacts. Sections 5.1 and 5.2 of the EIS contain our conclusions and a compilation of our recommended mitigation measures, respectively.

Construction of the Project would affect about 1,613.5 acres of land, including the pipeline facilities, aboveground facilities, pipe and contractor ware yards and staging areas, and access roads. Permanent operations would require about 784 acres of land, of which 715 acres would be for the pipeline right-of-way, 61 acres would be affected by aboveground facilities, and 8 acres would be affected by new permanent access roads. The remaining 829.5 acres of land disturbed during construction would be restored and allowed to revert to its former use.

Geology

Mineral resources in the Project area include crushed stone, cement, tripoli, lime, and sand and gravel production. There are 27 abandoned or reclaimed mines along the route, all located within Luzerne County. We are recommending that PennEast provide the results of its ongoing evaluation of potential presence of working and abandoned mines near the proposed crossing of the Susquehanna River. There are two active quarries within 0.25 mile of the Project area and two active industrial mineral quarries about 4 miles from the Project, all located in Luzerne County. PennEast has contacted the quarry owners and aligned the pipeline to avoid future expansion plans of these quarries. There are no mines or quarries located within 0.25 mile of the Project in New Jersey. There are no mapped locations of oil and gas wells within 0.25 mile of the Project.

Seismic hazards with potential to affect the pipeline include earthquakes, surface faults, and soil liquefaction. The pipeline would be designed in accordance with all applicable federal and state safety codes, which would govern pipeline thickness, welding standards for joints, and pipeline strength. We conclude that this would allow the pipeline to withstand nearly all ground shaking that could be anticipated to occur from an earthquake.

The Project would be located in an area considered to have a low incidence of landslides for the New Jersey portion of the Project. In Pennsylvania, however, portions of the Project are susceptible to landslides. Site-specific evaluations of landslide risks are ongoing. In Phase 1 of its Terrain Mapping and Geohazard Risk Evaluation Report PennEast identified the areas where it would conduct further field investigation and analysis during Phase 2 and 3 of the Geohazard Risk Evaluation to be used in the final design. We are recommending that PennEast include in its pipeline design geotechnical report an evaluation of liquefaction hazards along the pipeline route and at the compressor station site, a final landslide hazard inventory, as well as necessary mitigation measures and a post-construction monitoring plan. We are also recommending that PennEast include in its pipeline design geotechnical report the results of ongoing evaluations necessary to support final pipeline routing/mitigation measures through geologically hazardous areas, a final landslide inventory, specific landslide mitigation measures with locations, and a post-construction landslide monitoring plan.

PennEast would implement mitigation measures to control waterbody flow increases during pipeline installation activities in accordance with PennEast's Erosion and Sediment Control Plan (E&SCP). No permanent aboveground facilities are located within 100-year floodplains as reported by the Federal Emergency Management Agency. Aboveground facilities located near floodplains and pipeline stream crossings would be designed to prevent potential impacts from high-velocity flows, largely by controlling erosion, in accordance with PennEast's E&SCP.

The portions of the Project with potential karst impacts include sections of the Project in Carbon, Northampton, and Bucks Counties in Pennsylvania and Hunterdon County in New Jersey, totaling about 13.8 miles. PennEast continues to complete additional geophysical investigations as landowner permissions become available, and would incorporate this work into a final Karst Mitigation Plan. We are recommending that PennEast file a final Karst Mitigation Plan.

Naturally occurring arsenic is present in trace amounts in the rocks for the Newark Basin of southeastern Pennsylvania and New Jersey. PennEast conducted a leachability evaluation of rock samples collected along the proposed pipeline route. Based on the results of this study, we conclude that no mitigation measures related to arsenic mobilization are necessary during Project construction and operation. PennEast has prepared a well testing plan and proposes to conduct groundwater quality testing of potentially affected wells prior to construction that would provide a baseline to determine whether any arsenic increases in groundwater occur after the pipeline is installed and operational. In the unlikely event that construction results in any impacts on a water-supply well, PennEast would provide a treatment system to remove arsenic from the drinking water at individual properties or find an alternative water source.

PennEast is conducting geotechnical investigations at 11 proposed horizontal direction drill (HDD) crossings. The purpose of the geotechnical investigations is to understand if the existing condition would be suitable to use the HDD method and to help design each HDD crossing. Some field analysis is incomplete due to lack of permission to access the right-of-way to install borings, changes in the proposed alignment and design, and variation in geologic materials encountered requiring modifications in the drilling program. PennEast has also developed a HDD Drilling Plan for Karst Terrain, to be included as part of the Karst Mitigation Plan, as several of the crossings would be performed in carbonate rock. We are recommending that PennEast file the results of all outstanding geotechnical investigations in karst areas and the final planned design of each HDD crossing prior to construction.

We conclude that the Project would not have significant impacts on geologic resources. In addition, with the implementation of PennEast's proposed mitigation measures as well as its Blasting Plan, Karst Mitigation Plan, and E&SCP, and our recommendations, the geologic risk to Project facilities would be minimized.

Soils

Areas with shallow depth to bedrock crossed by the pipeline pose a risk of introducing rock into the topsoil in agricultural and residential areas. Minimization efforts would include topsoil segregation and protection along the trench, rock backfill in residential and agricultural areas only to the top of the existing bedrock profile, and disposal of excess rock fragments in an approved manner so as to not incorporate rock fragments into topsoil layers.

PennEast would minimize soil compaction and rutting, erosion, impacts on prime farmland and drainage tiles and increase revegetation potential by following its E&SCP and FERC's Upland Erosion Control, Revegetation, and Maintenance Plan (Plan) and Wetland and Waterbody Construction and Mitigation Procedures (Procedures). If contaminated soils or groundwater are encountered during construction, PennEast would follow protocol in its Unexpected Contamination Encounter Procedures.

Implementation of PennEast's E&SCP, FERC's Plan and Procedures and other project-specific plans would adequately avoid, minimize, or mitigate construction impacts on soil resources. Permanent impacts on soils would mainly occur at the aboveground facilities where the sites would be converted to industrial use. Based on our analysis, we conclude that potential impacts on soils would be avoided or effectively minimized or mitigated.

Water Resources and Wetlands

Groundwater in the Project area includes four principal bedrock aquifer systems as well as a number of surficial unconsolidated aquifers in Pennsylvania and New Jersey. In addition, the Project would cross two EPA-designated sole source aquifers. The Project would cross three wellhead protection areas, the Riegelsville Borough Zone III in Pennsylvania and two well head protection areas in Milford Borough and Alexandria Township, New Jersey.

There are no public and/or private water supply wells or springs that would be located within 150 feet of the pipeline construction workspace in Pennsylvania. Two public supply wells were identified within 150 feet of the pipeline construction workspace in Hunterdon County, New Jersey. Because surveys along the Project route are not yet complete, we are recommending that, prior to construction, PennEast provide a revised list of water wells and springs within 150 feet of any construction workspace (500 feet in areas characterized by Karst terrain) based on completed surveys. PennEast has prepared a Well Monitoring Plan to outline procedures for pre- and post-construction monitoring of all identified drinking water supply wells, including private, community, municipal/public wells, and springs, within 150 feet of the proposed construction workspace (500 feet in areas characterized by Karst terrain).

PennEast identified areas of potential groundwater contamination and prepared an Unanticipated Discovery of Contamination Plan that includes measures it would follow if any unanticipated contaminated soils are encountered during construction. We have reviewed the Unanticipated Discovery of Contamination Plan and find it acceptable; however, we are recommending that PennEast identify the management and field environmental professionals responsible for notification for contaminated sites. Accidental spills during construction and operations would be prevented or adequately minimized through implementation of PennEast's Spill Prevention, Control, and Countermeasures Plan.

In areas where blasting or rock hammering may be needed to excavate the trench to proper depth, fracturing of the bedrock may result in shallow groundwater infiltration in these areas. Blast charges would be limited to that needed to fracture rock to the required trench depth, and fracturing of bedrock would therefore be limited to within several feet of the pipeline trench. All blasting would be performed in a manner consistent with the guidance in PennEast's Project-specific Blasting Plan that includes measures to minimize groundwater impacts.

The Project would cross 255 waterbodies (159 perennial, 45 intermittent, 40 ephemeral, and 11 open water), 11 of which are classified as major waterbodies that are over 100 feet in width. PennEast proposes to cross waterbodies using a combination of HDD, bores, and dry-crossing methods to minimize in-stream turbidity impacts. Beltzville Lake, the Lehigh River/Lehigh Canal the Delaware River/Delaware Canal, Lockatong Creek (at two locations), and an unnamed tributary to Woolsey Brook would be crossed using the HDD method. We have reviewed PennEast's HDD Inadvertent Returns and Contingency Plan and HDD profiles; however, we are recommending that PennEast file results of all outstanding geotechnical investigations and file final planned designs for each HDD crossing.

PennEast is proposing to use both surface water and municipal water sources for hydrostatic testing that would ensure the safe integrity of pipeline operations. In total, PennEast anticipates withdrawing about 18 million gallons of water for hydrostatic testing. Because

PennEast has not identified the final hydrostatic test water withdrawal locations, we are recommending that, prior to construction, PennEast provide documentation of the final hydrostatic test water withdrawal sources and locations, and provide documentation that all necessary permits and approval have been obtained for withdrawal from each source.

Construction of the Project would temporarily impact about 56 acres of wetlands (26 acres in Pennsylvania and 30 acres in New Jersey) and permanently impact about 35 acres of wetlands (17 acres in Pennsylvania and 18 acres in New Jersey). In emergent wetlands, the impact of the construction and permanent rights-of-way would be relatively brief because the emergent vegetation would regenerate quickly, typically within one to three years. In scrub-shrub and forested wetlands, PennEast would maintain a 10-foot-wide corridor centered over the pipeline in an herbaceous state and would selectively cut trees within a 30-foot-wide corridor centered over the pipeline. The remainder of forested and scrub-shrub vegetation would be allowed to return to preconstruction conditions and would not be affected during operation. No permanent fill or loss of wetland area would result from construction and operation of the Project.

Construction and operation-related impacts on wetlands would be mitigated by PennEast's compliance with the conditions of permits issued under sections 401 and 404 of the Clean Water Act, by implementing the wetland protection and restoration measures contained in its E&SCP, and through measures determined during consultation with federal and state agencies. Because at least one wetland with extremely saturated soils has been identified along the Project route, we are recommending that PennEast identify special construction methods for construction in extremely saturated wetlands as well as justification of any resulting required additional workspace.

Vernal pools are considered to be communities of special concern in both Pennsylvania and New Jersey and the Project would impact several vernal pool areas within the proposed pipeline right-of-way. Based on current information, approximately 0.13 acre of vernal pool habitats would be impacted by construction of the Project, with 0.11 acre permanently impacted during operation. Because surveys along the Project route are not yet complete, we are recommending that, prior to construction, PennEast provide a revised table of impacts on vernal pools within or near the proposed workspace based on completed surveys.

Based on our analysis, we conclude that the Project is not expected to significantly impact groundwater, surface water, or wetland quality or quantity during construction or operation with implementation of PennEast's proposed mitigation measures as well as our recommendations.

Aquatic Resources

The Project would cross multiple waterbodies, thereby potentially affecting aquatic biological resources (e.g., invertebrates and fish) during the initial crossing of these waterbodies during construction, as well as during the operation of the Project. Different crossing methods, including conventional dry ditch, conventional bore, and HDD, would be used during these crossings depending upon the sensitivity and environmental characteristics of the resource that would be affected at each individual crossing.

Construction of the pipeline could have both direct and indirect impacts on aquatic biological resources. In-stream pipeline construction could remove habitat, temporarily increase sedimentation and turbidity in the water column, increase the potential for streambank erosion, temporarily disturb streambed foraging areas, and temporarily increase the potential for fuel or chemical spills. To minimize the extent and duration of these potential impacts, PennEast would implement the requirements and Best Management Practices found in its E&SCP and FERC's Upland Erosion Control, Revegetation, and Maintenance Plan (Plan) and Wetland and Waterbody Construction and Mitigation Procedures (Procedures).

The Project has the potential to restrict the flow of water as well as the movement of aquatic organisms within the waterbody during both construction and operation of the Project if the crossing is not constructed correctly. The conventional bore and HDD crossing method would involve installing the pipeline segment beneath the waterbody which would prevent disturbance of bottom sediments and avoid altering the flow of water within the waterbody. The conventional dry-ditch method would use flumes or dam-and-pumps to move water around the open trench. To ensure that the flow of water and movement of fish is not impacted on a long-term basis at the proposed crossings, PennEast would ensure that the depth of the pipe through waterbodies would prevent the pipe from becoming perched within the waterbody, and install culverts and/or bridges used at the proposed permanent access road crossings in compliance with all state and federal requirements.

PennEast would comply with all waterbody crossing windows established by state and federal permits in order to avoid or minimize impacts on aquatic biological resources. In accordance with the FERC Procedures, to minimize impact on fisheries resources, all in-stream work would be performed between June 1 and September 30 to protect cold water fisheries and between June 1 and November 30 to protect warm water fisheries, unless other more stringent agency timing restrictions would apply to the affected waterbody.

With the implementation of these measures, as well as the requirements found in FERC's Plan and Procedures, we conclude that overall impacts on aquatic resources would be adequately minimized.

Vegetation and Wildlife

Direct impacts on wildlife during construction could include the displacement of wildlife from the Project area, as well as direct mortality of some individuals. Some species are likely to be displaced from habitats that are cleared of vegetation as well as from areas adjacent to construction sites due to construction noise and visual disturbances.

Impacts on forest habitat could include fragmentation and edge effects. The proposed pipeline route was sited to avoid areas containing large, interior forested stands where possible. When forests could not be avoided, proposed routing through a forest was accomplished by locating the pipeline as far from the interior portion of the forest as practicable to maximize preservation of interior forest habitat. About 44.3 miles (26.8 miles in Pennsylvania and 17.5 miles in New Jersey), or about 37 percent, of the 115.1-mile-long pipeline route would be constructed adjacent to existing rights-of-way (see section 2.2.1) to further minimize habitat impacts.

Following construction, all temporarily disturbed areas would be restored in accordance with our Plan and Procedures. Impacts on forested habitats would be considered long-term because of the time required to restore woody vegetation to preconstruction conditions. During operation, routine vegetation maintenance of the right-of-way would be required to allow access for pipeline patrols, and to maintain access in the event of emergency repairs. In upland areas, maintenance of the right-of-way would involve periodic vegetation maintenance within the entire permanent right-of-way, and a 10-foot-wide strip centered on the pipeline would be mowed annually.

The Project would cross areas identified as unique or exemplary wildlife habitats, including the Bear Creek Preserve, Sourland Mountain Region, State Game Lands, Deer Management Areas, and Important Bird Areas (including Hickory Run State Park, Kittatinny Ridge, Musconetcong Gorge, Everittstown Grassland, Baldpate Mountain, and Pole Farm).

PennEast would work with the appropriate regulatory agencies as part of the permitting process to minimize the potential that invasive or noxious plant species spread during construction of the Project. We are recommending that PennEast file an Invasive Plant Species Management Plan that would be implemented during construction and operation.

PennEast would implement restrictions on the locations and timing of construction activities, as required by state and federal agencies, in order to avoid or minimize impacts on wildlife species and their habitats. Furthermore, PennEast is required to develop a Migratory Bird Conservation Plan and implement measures recommended by the FWS to protect bald eagles in order to comply with the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act. In addition, PennEast would work with the local soil conservation district as well as land management agencies to determine the appropriate seed mixes that should be used during revegetation efforts.

With the implementation of these measures, as well as the requirements found in FERC's Plan and Procedures, we conclude that overall impacts on vegetation and wildlife would be adequately minimized.

Threatened, Endangered, and Special Status Species

The species included in the Threatened, Endangered, and Special Status Species section of this EIS include those species that are federally listed under the Endangered Species Act (ESA), those that are listed under applicable state endangered species laws (e.g., the Pennsylvania Endangered Species Coordination Act and the New Jersey Endangered Species Conservation Act), and those that are considered Species of Special Concern in New Jersey.

Through informal consultation with the FWS and National Marine Fisheries Service (NMFS), five federally listed threatened or endangered species have been identified as potentially occurring in the Project area. These species include two mammals (Indiana bat and northern long-eared bat), one reptile (bog turtle), one invertebrate (dwarf wedgemussel), and one plant species (northeastern bulrush). The Pennsylvania Fish and Boat Commission (PFBC) further identified two fish species that are listed under both the ESA and the two applicable state endangered species laws (the Atlantic sturgeon and shortnose sturgeon) as potentially occurring downstream of the Project area; although the NMFS stated that these listed fish species do not occur in the Project area and would not be impacted by the Project. Due to this comment by the PFBC, analysis of these two listed fish species was included in this EIS.

PennEast has attempted to avoid habitats and known occurrences of ESA listed species, and has committed to avoidance and minimization measures related to these species, including 1) timing restrictions on tree clearing in areas identified by the FWS as important to listed bat species; 2) implementation of a 300-foot no disturbance buffer around wetlands and 150-foot no disturbance buffer around waterways that support listed species; 3) use of a HDD crossing method for waterbodies suspected of supporting listed species; and 4) the implementation of surveys for listed species in all suitable habitats crossed by the Project. Furthermore, consultation with the FWS is ongoing regarding ESA listed species, and as part of this ongoing consultation process the FWS may develop additional measures beyond those described in this EIS to avoid or minimize impacts on ESA listed species. The implementation of these measures would likely avoid or minimize some of the potential impacts that could occur on ESA listed species. All areas of potential suitable habitats have not been surveyed to date (indicating that additional occurrences of these species is possible along the Project).

Therefore, our preliminary determination for the Indiana bat, northern long-eared bat, bog turtle, dwarf wedgemussel, and northeastern bulrush is that the Project "*may affect and is likely to adversely affect*" these species. Our preliminary determination for the Atlantic sturgeon and shortnose sturgeon is "*no effect*", as these species occur approximately 20 river-miles downstream of the Project and the implementation of the Project's design features (e.g., the proposed HDD crossing of the Delaware River/Delaware Canal, as well as the requirements found in PennEast's E&SCP and FERC's Plan and Procedures) would prevent any Project related effects from occurring in waters 20 miles downstream. We have further recommended that PennEast complete all surveys of potential suitable habitats for special status species in the Project area, and not construct any portion of the Project until formal consultation with the FWS is complete.

FERC requests that the FWS consider this EIS as the Biological Assessment.

The Project has the potential to impact multiple state listed species, as well as New Jersey Species of Special Concern. PennEast has stated that it would adhere to the recommendations and requirements of the respective state agencies with jurisdiction over state listed species and state species of concern in order to avoid or minimize impacts on these species. PennEast has also indicated that ongoing permit review by Pennsylvania and New Jersey may result in the identification of additional avoidance, minimization, or mitigation measures that would be included as part of the Project's permit conditions. In general, we conclude that relying on state-level experts for the development of measures that would minimize impacts on state listed species and state species of concern would appropriately avoid or reduce impact on these species. As a result, we have recommended that PennEast continue to work with the state agencies on measures to avoid or minimize impacts on these state species.

Land Use, Recreation, and Visual Resources

Construction of the Project would impact about 1,613.5 acres. About 66 percent of this acreage would be utilized for the pipeline facilities, including the construction right-of-way and additional temporary work space (ATWS). The remaining acreage affected during construction would be associated with aboveground facilities (4 percent), pipe and contractor ware yards (23 percent), and access roads (7 percent). During operation, the new permanent pipeline right-of-way, aboveground facilities, and permanent access roads would encumber 784 acres.

The maintained right-of-way would be mowed no more than once every three years, but a 10-foot-wide strip centered over the pipeline might be mowed annually to facilitate corrosion and other operational surveys. The construction of permanent structures or the planting of trees, would be prohibited within the permanent right-of-way. To facilitate pipeline inspection, operation, and maintenance, the entire permanent right-of-way in upland areas would be maintained in an herbaceous/scrub-shrub vegetated state.

Based on field surveys conducted by PennEast where access was available, and review of aerial photography in other locations, PennEast's proposed construction work areas would be located within 50 feet of 462 structures (i.e., houses and apartment buildings, commercial or industrial facilities, sheds, garages), with 298 structures within 25 feet of PennEast's proposed construction work area. A total of 66 of these structures within 25 feet of PennEast's proposed construction work area are residential structures. PennEast has provided site-specific construction plans for some residences within 25 feet of the construction work areas. We are recommending that PennEast provide any remaining site-specific construction plans for all residences within 25 feet of the construction right-of-way and ATWS including landowner approval.

Thirteen planned residential and commercial development projects have been identified within 0.25 mile of the proposed Project facilities, including seven residential developments, three commercial developments, two municipal developments, and one hospital expansion. We are recommending that PennEast continue to consult with landowners for several of these planned developments, and file any mitigation measures that PennEast would implement to minimize impacts on the developments prior to the end of the draft EIS comment period.

PennEast would require about 104 acres of agricultural land in Pennsylvania and 100 acres in New Jersey as new permanent right-of-way, but operation of the proposed pipeline would not affect the continuing use of these areas for agricultural activities after construction is complete. Following construction, all affected agricultural land would be restored to preconstruction conditions to the extent possible, in accordance with PennEast's E&SCP and Agricultural Impact Minimization Plan, and with any specific requirements identified by landowners or state or federal agencies with appropriate jurisdiction.

In general, the effects of the Project on recreational and special interest areas occurring outside of forestland would be temporary and limited to the period of active construction, which typically lasts several weeks or months in any one area. These effects would be minimized by implementing the measures in PennEast's E&SCP, Best Management Practices, and other project-specific construction plans. In addition, PennEast would continue to consult with the owners and managing agencies of recreation and special interest areas regarding the need for specific construction mitigation measures. PennEast considered several alternative crossing locations of the Appalachian National Scenic Trail, and has developed a site-specific crossing plan at this location, after considering comments and perspectives shared by the National Park Service, Appalachian Trail Conservancy, Pennsylvania Game Commission, and other stakeholders. We have reviewed this crossing plan and find it acceptable. However, PennEast is responsible for obtaining the pertinent permits from the appropriate authorities for crossing the Appalachian National Scenic Trail at this location. To further minimize effects on other recreation and special interest areas crossed by the Project, we are recommending that PennEast file an update on the status of development of the site-specific crossing plans for each of the recreation and special interest areas listed as being crossed or otherwise affected, including site-specific timing restrictions, proposed closure details and notifications, specific safety measures, and other mitigation to be implemented.

The Project would cross a number of areas enrolled in a variety of conservation programs. Although there would be temporary impacts and potential disruption during construction, following pipeline installation all activities and accesses currently available to the public would be returned to their original state. We are recommending that PennEast file the results of consultations with the NRCS and the landowner of the one known USDA easement crossed, any proposed mitigation measures to be implemented, and copies of correspondence prior to the end of the draft EIS comment period. The limited permanent easement area that PennEast would acquire for pipeline installation and operation would lose its conservation status, but only in that PennEast would acquire the development rights to install and maintain the pipeline in this easement. The majority of the land area that is subject to conservation easement restrictions would retain its conservation restriction status outside of PennEast's permanent right-of-way.

The Project would not cross any known landfills or hazardous waste sites, although portions of the Project, between mileposts 47 and 52 would occur within a 1-mile buffer from the Palmerton Zinc Pile Superfund site. The pipeline would not impact existing and/or on-going Superfund site remedies, and levels of contamination, if existing outside of the Superfund site boundary, would be within an acceptable risk threshold and remedial action would not be required.

Visual resources along the proposed pipeline route are a function of geology, climate, and historical processes, and include topographic relief, vegetation, water, wildlife, land use, and human uses and development. A portion of the new pipeline (about 37 percent) would be installed within or parallel to existing rights-of-way. As a result, the visual resources along these portions of the Project have been previously affected by other similar activities. Impacts in other areas would be greatest where the pipeline route would parallel or cross roads and the pipeline right-of-way may be seen by passing motorists; from residences where vegetation used for visual screening or for ornamental value is removed; and where the pipeline is routed through forested areas.

After construction, all disturbed areas, including forested areas, would be restored in compliance with PennEast's E&SCP; federal, state, and local permits; landowner agreements; and easement requirements. Generally this would include seeding the restored areas with grasses and other herbaceous vegetation, after which trees would be allowed to regenerate within the temporary workspaces. The visual effects of construction on forested areas would be permanent on the maintained right-of-way where the regrowth of trees would not be allowed, and would be long term, lasting several years or longer, in the temporary workspaces. The greatest potential visual effect would result from the removal of large specimen trees, but the visual effects of removing smaller trees would even last for several years. PennEast proposes to reseed with native plants to revegetate the construction right-of-way which would result in the establishment of native wildflowers for pollinators along the maintained right-of-way.

The compressor station would be located in previously logged, disturbed forest in Carbon County, Pennsylvania. Visual disturbance would be limited to vegetation clearance for the access road off Pennsylvania Route 940 and partial views of the site from Interstate 80. We conclude that the retention of trees and shrubs around the perimeter of the compressor station site would provide sufficient cover to avoid any significant adverse visual impacts.

With implementation of PennEast's proposed impact avoidance, minimization, and mitigation plans, and our recommendations, we conclude that overall impacts on land use and visual resources would be adequately minimized.

Socioeconomics

Construction of the Project would result in minor beneficial socioeconomic impacts due to increases in construction jobs, payroll taxes, purchases made by the workforce, and expenses associated with the acquisition of material goods and equipment. Operation of the Project would have a minor to moderate positive effect on the local governments' tax revenues due to the increase in property taxes that would be collected from PennEast.

Cultural Resources

A sizeable portion of the Project has not been investigated for cultural resources. Where PennEast had been granted right of entry, it conducted cultural resources identification surveys on approximately 3,110 acres in Pennsylvania and 587 acres in New Jersey. The surveys identified 14 archaeological sites in Pennsylvania and six sites in New Jersey. Additionally there were 110 aboveground historic resources identified in Pennsylvania and 41 in New Jersey. PennEast has recommended avoiding a number of these resources and conduct resource evaluations, where necessary. Although the Pennsylvania and New Jersey State Historic Preservation Offices (SHPOs) concurred with some of the recommendations, they did not agree with all of the recommendations by PennEast. Consultation is ongoing with the Pennsylvania and New Jersey SHPOs. We are recommending that PennEast provide documentation of Pennsylvania and New Jersey SHPOs' concurrence with PennEast's proposed avoidance, resource identification/ recommendations, updated documentation, avoidance plans, and evaluation reports/treatment plans, when necessary. If National Register of Historic Places-eligible archaeological sites cannot be protected from Project impacts, PennEast would develop a treatment plan or mitigation of adverse effects.

The National Park Service expressed concerns regarding potential Project effects to trails and cultural resources. PennEast has ongoing consultation with the National Park Service regarding these potential effects. Additionally, we are recommending that PennEast develop a vibration monitoring plan and modify its blasting plan to include a review of potential effects to cultural resources.

To ensure that our responsibilities under section 106 of the National Historic Preservation Act are met, we are recommending that PennEast not begin construction until any additional required surveys are completed, survey reports and treatment plans (if necessary) have been reviewed by the consulting parties, and we provide written notification to proceed. The studies and impact avoidance, minimization, and measures proposed by PennEast, and our recommendation, would ensure that any adverse effects on cultural resources would be appropriately mitigated.

Air Quality and Noise

Construction of the Project components would result in short-term increases in emissions of some air pollutants due to the use of equipment powered by diesel fuel or gasoline engines and the generation of fugitive dust due to the disturbance of soil and other dust-generating activities. Such air quality impacts would generally be temporary and localized, and are not expected to cause or contribute to a violation of applicable air quality standards. Local emissions may be elevated, and nearby residents may notice elevated levels of fugitive dust, but these would not be significant. Pipeline construction is anticipated to occur in four separate spreads, each of which is estimated to result in 6.5 months of emission-generating activities, while construction activities at the Kidder Compressor Station would take 6 months. Preparation of access roads and pipeyards would generate emissions for an estimated 3 months, including laying of gravel, and then removal of gravel at the end of construction. Construction staging areas would produce emissions for an estimated 10 months.

During operation of the pipeline and the Kidder Compressor Station, emissions of criteria pollutants, greenhouse gases (GHGs), and hazardous air pollutants would occur. Estimated emissions from the proposed Kidder Compressor Station are below all Prevention of Significant Deterioration (PSD) thresholds except for GHG. However, the requirements of PSD are not triggered if GHG is the only pollutant above the PSD threshold. Along the pipeline route, leaks and venting could occur at the compressor station and potentially from small leaks at flanges and valves. Emissions expected during operation of the pipeline would be relatively minor. No Federal Class I Areas would be impacted.

PennEast would be required to meet all federal and state air quality permitting requirements prior to construction and operation of the Project. PennEast would comply with federal and state air quality permitting rules, including the installation of mitigation measures and technologies required to meet federal and state air quality regulations. Therefore, we conclude that the Project would not result in significant air quality impacts.

Because the construction of the compressor station would exceed FERC's threshold at several noise-sensitive areas (NSAs), PennEast has agreed to implement mitigation measures, as necessary, such as use of temporary noise barriers. For NSAs that are closer to pipeline-related construction activity, such as the Econolodge, Pizza Residence, and Golf Course, mitigation may be needed depending on the construction activity. Depending on the listener proximity to the Project right-of-way, pipeline construction noise may also be audible to recreationists at Hickory Run State Park and the eastern end of Beltzville State Park. During construction, PennEast would employ a combination of noise mitigation methods, including equipment noise controls, temporary noise barriers, and administrative measures including temporary relocation of residents, to minimize noise related to construction activity at NSAs near the Project. These would include appropriate mitigation measures to achieve compliance during HDD installation operations and equipping haul trucks and other engine-powered equipment with adequate mufflers. PennEast would restrict timing of noisy construction or demolition work to 7 a.m. to 10 p.m. We are recommending that PennEast file a noise mitigation plan prior to construction and implement this plan during HDD or direct pipe construction activities.

The Project would likely require blasting in some areas of the proposed route to dislodge bedrock resulting in potential noise and vibration impacts. PennEast's Blasting Plan includes mitigation measures related to blasting activity. Blasting would be conducted in accordance with applicable agency regulations, including advance public notification and mitigation measures as necessary.

The primary source of operational noise for the Project would be the Kidder Compressor Station. PennEast would be required to meet the most restrictive noise level limits established by jurisdictional agencies. The FERC limit of 55 decibel-A weighted (dBA) day-night sound level, which is equivalent to a continuous noise level of 49 dBA, would be the governing limit for those areas where a more restrictive county, local, or station-specific regulation does not exist. PennEast would implement mitigation measures to ensure that the applicable standards are met at the nearest NSA, including installing the turbines in acoustically insulated and treated buildings and, if possible, locating the inlet silencer inside the compressor building. We are recommending that PennEast conduct noise surveys after completing the compressor station construction to confirm that noise standards are met.

If blow-off valves are to be used during planned maintenance, PennEast would affix a silencer to the blow-off valve to minimize noise impacts. Maintenance blowdown events would typically occur only during daytime hours and PennEast plans to notify all landowners in the immediate area. Due to the infrequency and short duration of the blowdown events, noise impacts are expected to be minimal; however, we are recommending that PennEast identify mitigation measures to minimize noise levels associated with emergency or maintenance MLV blowdown events.

Based on the analyses conducted, the proposed mitigation measures, and our recommendations, we concluded that construction and operation of the Project would not result in significant noise impacts on residents and the surrounding environment.

<u>Reliability and Safety</u>

The pipeline and aboveground facilities associated with the Project would be designed, constructed, operated, and maintained to meet the U.S. Department of Transportation (DOT)'s Minimum Federal Safety Standards in Title 49 Code of Federal Regulations part 192 and other applicable federal and state regulations. These regulations include specifications for material selection and qualification; minimum design requirements; and protection of the pipeline from internal, external, and atmospheric corrosion. The DOT rules require regular inspection and maintenance, including repairs as necessary, to ensure the pipeline has adequate strength to transport the natural gas safely. Further, although regulations requiring remote control shut-off valves have not yet gone into effect and would apply to pipelines built in the future, PennEast committed to the use of remote control shut-off valves for the proposed pipelines.

We conclude that PennEast's implementation of the above measures would ensure compliance with the DOT's regulations regarding public safety and the integrity of the proposed facilities.

<u>Cumulative Impacts</u>

A majority of the impacts associated with the Project in combination with other projects such as residential developments, utility lines, and transportation projects, would be temporary and relatively minor overall. However, some long-term cumulative impacts would occur on wetland and forested vegetation and associated wildlife habitats. Some long-term cumulative benefits to the community would be realized from the increased tax revenues. Short-term cumulative benefits would also be realized through jobs, wages, and purchases of goods and materials. Emissions associated with the Project would contribute to cumulative air quality impacts. There is also the potential, however, that the Project would contribute to a cumulative improvement in regional air quality if a portion of the natural gas associated with the Project displaces the use of other more polluting fossil fuels. With implementation of specialized construction techniques, the relatively short construction timeframe in any one location, and carefully developed resource protection and mitigation plans designed to minimize and control environmental impacts for the Project as a whole, we conclude that the cumulative impacts associated with the Project, when combined with other known or reasonably foreseeable projects, would be effectively limited.

ALTERNATIVES CONSIDERED

As an alternative to the proposed action, we evaluated the no-action alternative, energy alternatives, and system alternatives. We also evaluated pipeline routing alternatives and an alternative compressor station location.

While the no-action alternative would eliminate the short- and long-term environmental impacts identified in the EIS, the stated objectives of PennEast's proposal would not be met. We evaluated the use of alternative energy sources and the potential effects of energy conservation, but these measures similarly would not satisfy the objectives of the Project, provide an equivalent supply of energy, or meet the demands of the Project shippers.

Our analysis of system alternatives included an evaluation of whether existing or proposed natural gas pipeline systems could meet PennEast's objectives while offering an environmental advantage. There is no available capacity for existing pipeline systems to transport the required volumes of natural gas to the range of delivery points proposed by PennEast. Moreover, with the exception of the Transco Leidy Line, none of these existing pipeline systems are in close proximity to the production areas of northern Pennsylvania. We determined that an expansion of the existing Transco Leidy Line as an alternative would not be feasible due to densely populated areas along the line that would prevent looping. Expansion of the Transco Leidy Line would also not provide access to the delivery points proposed by PennEast. Other existing systems in the area of the Project would require significant expansions to meet the objectives of the Project, which would result in environmental impacts similar to or greater than the Project.

We evaluated whether an expansion of the proposed Atlantic Sunrise Project could serve as a system alternative. Approximately 100 percent of capacity for the Atlantic Sunrise Project, and 90 percent for the PennEast Project, has been contracted, therefore, there is customer demand for both projects. The Atlantic Sunrise Project would also not provide for the same delivery points for customers that have been identified for the PennEast Project. Consequently, there are no practicable existing or proposed system alternatives that are environmentally preferable to the Project.

We evaluated four major route alternatives to the proposed pipeline route. Because none of these would offer major environmental advantages over the proposed pipeline route, we do not consider the route alternatives to be preferable to the proposed route. During the Project review process we evaluated 83 route variations that were identified by PennEast or suggested by landowners, municipalities, and other stakeholders. The variations were identified to avoid or reduce effects on environmental or other resources at specific locations, resolve engineering or constructability issues, address specific landowner requests, or address other stakeholder concerns. We evaluated route variations as summarized in section 3 of this EIS. Of the 83 variations, PennEast has incorporated 39 into the proposed route. We have reviewed the route variations incorporated into the proposed route and agree with PennEast's conclusions regarding incorporation of the 39 route variations into the proposed route.

We evaluated one alternative site for the proposed Kidder Compressor Station and do not consider the alternative site to be preferable to the proposed site. We also evaluated the feasibility of installing electric motor driven compressor units at the Kidder Compressor Station instead of the proposed natural gas-fired compressor turbines. We found that this alternative would result in higher overall emissions due to emissions created by generation of the needed electricity, and this alternative would result in additional impacts from construction of the needed electric transmission service to the site. We do not consider electric motor driven compressor units to be preferable to the proposed natural gas-fired compressor turbines.

CONCLUSIONS

We determined that construction and operation of the Project would result in some adverse environmental impacts, but impacts would be reduced to less-than-significant levels with the implementation of PennEast's proposed and our recommended mitigation measures. This determination is based on a review of the information provided by PennEast and further developed from data requests; field investigations; scoping; literature research; alternatives analysis; and contacts with federal, state, and local agencies as well as Indian tribes and individual members of the public.

Although many factors were considered in this determination, the principal reasons are:

- About 44.3 miles (26.8 miles in Pennsylvania and 17.5 miles in New Jersey), or about 37 percent, of the 115.1-mile-long pipeline route would be constructed adjacent to existing rights-of-way.
- PennEast would minimize impacts on natural and cultural resources during construction and operation of the Project by implementing its E&SCP, FERC's Plan and Procedures, and other Project-specific plans (Unanticipated Discovery Plan, Agricultural Impact Minimization Plan, Karst Mitigation Plan, HDD Drilling Plan for Karst Terrain, HDD Inadvertent Returns and Contingency Plan, Unexpected Contamination Encounter Procedures, Spill Prevention Control and Countermeasures Plan, Blasting Plan, Invasive Plant Species Control Plan, Well Monitoring Plan, and Compensatory Wetland Mitigation Plan).
- The FERC staff would complete the process of complying with section 7 of the ESA prior to construction.
- The FERC staff would complete consultation under section 106 of the National Historic Preservation Act and implementing regulations at 36 CFR 800.
- PennEast would comply with all applicable air and noise regulatory requirements during construction and operation of the Project.
- An environmental inspection program and a third-party monitoring oversight program would be implemented to ensure compliance with the mitigation measures that become conditions of the FERC authorization.

In addition, we developed Project-specific mitigation measures that PennEast should implement to further reduce the environmental impacts that would otherwise result from construction and operation of the Project. We determined that these measures are necessary to reduce adverse impacts associated with the Project and, in part, are basing our conclusions on implementation of these measures. Therefore, we are recommending that these mitigation measures be attached as conditions to any authorization issued by the Commission. These recommended mitigation measures are presented in section 5.2 of the EIS.

PENNEAST PIPELINE PROJECT
DRAFT ENVIRONMENTAL IMPACT STATEMENT

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF FIGURES

LIST OF TABLES

TECHNICAL ACRONYMS AND ABBREVIATIONS

µg/l	microgram per liter
µg/m^3	microgram per cubic meter
ACHP	Advisory Council on Historic Preservation
AMD	acid mine drainage
ANST	Appalachian National Scenic Trail
APE	area of potential effect
AQCR	Air Quality Control Region
ASME	American Society of Mechanical Engineers
ATC	Appalachian Trail Conservancy
ATW	approved trout water
ATWS	additional temporary workspaces
BA	Biological Assessment
BAT	Best Available Technology
BGEPA	Bald and Golden Eagle Protection Act
BMP	Best Management Practices
C-1	category one waters
C-2	category two waters
CAA	Clean Air Act
CAAA	1990 Clean Air Act Amendments
CEQ	Council on Environmental Quality
Certificate	Certificate of Public Convenience and Necessity
CFR	Code of Federal Regulations
CH_2O	formaldehyde
CH_4	methane
CO	carbon monoxide
CO_2e	carbon dioxide equivalent
Commission	Federal Energy Regulatory Commission
CWA	Clean Water Act
CWF	cold water fisheries
dB	decibel
dBA	decibel A-weighted
DFW	Division of Fish and Wildlife
DO	dissolved oxygen
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DRBC	Delaware River Basin Commissions
E&SCP	Erosion and Sediment Control Plan
EDR	Environmental Data Resources, Inc.
EFH	essential fish habitat
EI	Environmental Inspector
EIS	environmental impact statement
ENSP	Endangered and Nongame Species Program
EO	Executive Order
EPA	U.S. Environmental Protection Agency

TECHNICAL ACRONYMS AND ABBREVIATIONS – CON'T

ESA	Endangered Species Act
ESCGP-2	Erosion and Sediment Control General Permit
EV	exceptional value
FDCP	Fugitive Dust Control Plan
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FPM	Field Project Manager
FTA	Federal Transit Administration
FWS	U.S. Fish and Wildlife Service
g	gravities
GHG	greenhouse gases
GIS	Geographic Information System
gpd	gallons per day
HAP	hazardous air pollutant
HCA	high-consequence areas
HDD	horizontal directional drill
hp	horsepower
HQ	high quality
HRSF	Historic Resource Survey Form
IBA	Important Bird Area
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
JCP&L	Jersey Central Power & Light
kPa	kiloPascal
kW	kilowatt
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
LT	long-term
L_w	sound power level
M&R	metering and regulating
m^3	cubic meter
MAOP	maximum allowable operating pressure
MBTA	Migratory Bird Treaty Act
MCL	maximum contaminant level
Memorandum	Memorandum of Understanding on Natural Gas Transportation Facilities
MF	migratory fisheries
MLV	mainline valve
MMBtu/hr	million British thermal units per hour
MMDth/d	million dekatherms per day
MODAg	agricultural wetlands
MODL	lawns and stormwater management areas
MOU	Memorandum of Understanding
MP	milepost
MSA	Magnuson-Stevens Fishery Conservation and Management Act

TECHNICAL ACRONYMS AND ABBREVIATIONS – CON'T

MW	megawatts
NAAQS	National Ambient Air Quality Standards
NCA	National Climate Assessment
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NGA	Natural Gas Act
NHD	National Hydrography Dataset
NHL	National Historic Landmark
NHP	Natural Heritage Program
NHPA	National Historic Preservation Act
NJAC	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NJDOT	New Jersey Department of Transportation
NMFS	National Marine Fisheries Service
NNLRA	No-Net Loss Reforestation Act
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	National Oceanic and Atmospheric Administration National Marine Fisheries Service
NOI	Notice of Intent
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCC	Northeast Regional Climate Center
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
NSA	noise-sensitive area
NSPS	New Source Performance Standards
NSR	New Source Review
NT	non-trout
NWI	National Wetlands Inventory
NWSRS	National Wild and Scenic Rivers System
O_3	ozone
OPS	Office of Pipeline Safety
OSHA	U.S. Department of Labor, Occupational Safety and Health Administration
Pa. Code	Pennsylvania Code
PADCNR	Department of Conservation and Natural Resources
PADCNR	Pennsylvania Department of Conservation and Natural Resources
PADEP	Pennsylvania Department of Environmental Protection
Pb	lead
PCB	polychlorinated biphenyls
PCWS	Public Community Water Supply

TECHNICAL ACRONYMS AND ABBREVIATIONS – CON'T

PEM	palustrine emergent
PennDOT	Pennsylvania Department of Transportation
PennEast	PennEast Pipeline Company, LLC
PFBC	Pennsylvania Fish and Boat Commission
PFO	palustrine forested
PGA	peak ground acceleration
PGC	Pennsylvania Game Commission
PHMC	Pennsylvania Historical and Museum Commission
PHMSA	U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration
Plan	Upland Erosion Control, Revegetation, and Maintenance Plan
PM	particulate matter
PM_{10}	PM less than 10 microns in diameter
$PM_{2.5}$	PM less than 2.5 microns in diameter
ppb	parts per billion
ppm	parts per million
PPV	peak particle velocity
Procedures	Wetland and Waterbody Construction and Mitigation Procedures
Project	PennEast Pipeline Project
PSD	Prevention of Significant Deterioration
PSPGP-5	Pennsylvania State Programmatic General Permit
PSS	palustrine scrub-shrub
PTE	potential to emit
PUB	palustrine unconsolidated bottom
PURTA	public utility realty tax
RHA	Rivers and Harbors Act
ROI	region of influence
RTE	Rare, Threatened, and Endangered
RV	recreational vehicle
scf	standard cubic feet
scfd/mile	standard cubic foot of natural gas per day per mile of pipeline
SCS	Soil Conservation Service
SESC	Soil Erosion and Sediment Control
SGLs	State Game Lands
SHPO	State Historic Preservation Office
SIP	state implementation plan
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control and Countermeasures
SPDES	State Permit Discharge Elimination System
SRBC	Susquehanna River Basin Commission
SSA	sole source aquifer
SSURGO	Soil Survey Geographic Database
Texas Eastern	Texas Eastern Transmission, LP
TM	trout maintenance

TECHNICAL ACRONYMS AND ABBREVIATIONS – CON'T

TMDL	Total Maximum Daily Load
TP	trout production
tpy	tons per year
Transco	Transcontinental Gas Pipe Line
tribes	Federally recognized tribes
TSF	trout stocked fisheries
TSS	total suspended solids
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USGCRP	U.S. Global Change Research Program
USGS	U.S. Geological Survey
VdB	vibration decibels
VOC	volatile organic compound
WEG	wind erodibility group
WHPA	wellhead protection area
WMAs	Wildlife Management Areas
WTW	wilderness trout streams
WWF	warm water fisheries

1.0 INTRODUCTION

On September 24, 2015, PennEast Pipeline Company, LLC (PennEast) filed an application with the Federal Energy Regulatory Commission (Commission or FERC) under section 7(c) of the Natural Gas Act (NGA) and Parts 157 and 284 of the Commission's regulations. The application was assigned Docket No. CP15-558-000 and a *Notice of Application* was issued on October 8, 2015 and noticed in the *Federal Register* on October 15, 2015. PennEast is seeking a Certificate of Public Convenience and Necessity (Certificate) from the FERC to construct, operate, and maintain a new natural gas pipeline system, including pipeline facilities, a compressor station, metering and regulating stations, and appurtenant facilities in Pennsylvania and New Jersey.

We[5] prepared this environmental impact statement (EIS) to assess the environmental impacts associated with the construction and operation of the facilities proposed by PennEast in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, as amended. The U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (FWS), U.S. Department of Agriculture, Natural Resource Conservation Service (NRCS), and U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) are cooperating agencies assisting in the preparation of the EIS because they have jurisdiction by law or special expertise with respect to environmental impacts associated with PennEast's proposal. The roles of the FERC and the cooperating agencies in the Project review process are described in section 1.2.

PennEast's proposal, referred to as the PennEast Pipeline Project (also referred to in this EIS as the PennEast Project or Project) involves the construction and operation of about 118.8 miles of natural gas pipeline and associated equipment and facilities in Pennsylvania and New Jersey (see figure 1-1). The 118.8 miles would consist of the following facilities:

- 115.1 miles of new, 36-inch-diameter pipeline extending from Luzerne County, Pennsylvania to Mercer County, New Jersey;
- the 2.1-mile Hellertown Lateral consisting of 24-inch-diameter pipe in Northampton County, Pennsylvania;
- the 0.1-mile Gilbert Lateral consisting of 12-inch-diameter pipe in Hunterdon County, New Jersey;
- the 1.5-mile Lambertville Lateral consisting of 36-inch-diameter pipe in Hunterdon County, New Jersey;
- the 47,700 International Organization for Standardization (ISO) horsepower (hp) compressor station in Kidder Township, Carbon County, Pennsylvania;
- eight metering and regulating (M&R) stations for the Project interconnects;
- 11 mainline valve (MLV) sites; and
- four pig launcher/receiver sites.

[5] The pronouns "we," "us," and "our" refer to the environmental staff of the FERC's Office of Energy Projects.

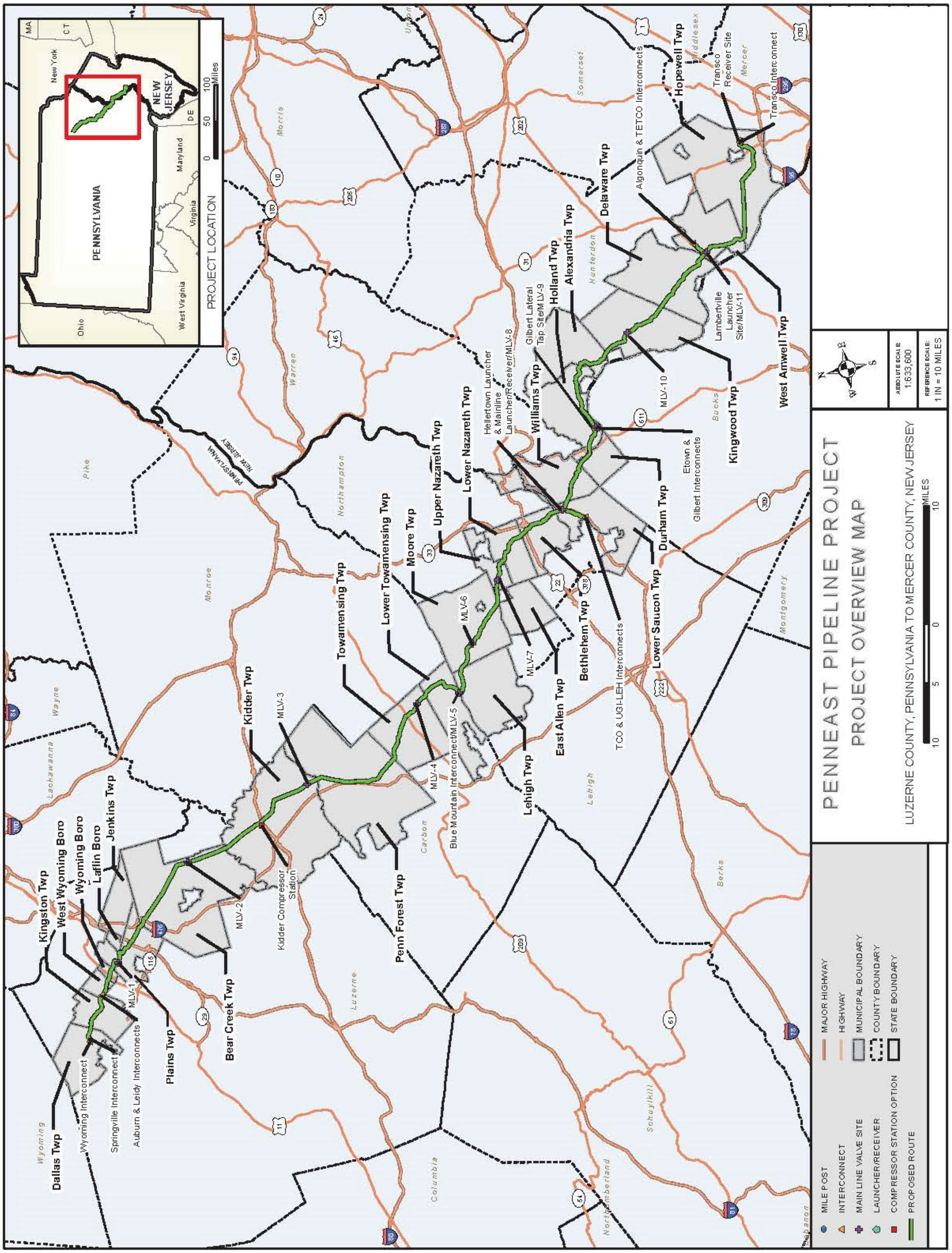

Figure 1-1 Project Overview Map

1.1 PROJECT PURPOSE AND NEED

According to PennEast, the purpose of the Project is to provide about 1.1 million dekatherms per day (MMDth/d) of year-round natural gas transportation service from northern Pennsylvania to markets in New Jersey, eastern and southeastern Pennsylvania, and surrounding states. PennEast's stated objectives are to:

- provide low cost natural gas produced from the Marcellus Shale region in northern Pennsylvania to homes and businesses in New Jersey, Pennsylvania, and surrounding states;
- serve markets in the region with firm, reliable access to Marcellus Shale natural gas supplies versus traditional, more costly Gulf Coast regional supplies and pipeline pathways;
- provide enhanced competition among natural gas suppliers and pipeline transportation providers; and
- satisfy the needs of shippers seeking: additional supply flexibility, diversity, and reliability; liquid points for trading in locally produced natural gas; direct access to premium markets in the northeast and mid-Atlantic regions; ability to capture pricing differentials between the various interconnected pipelines; enhanced natural gas transportation system reliability; and direct access to affordable long-lived dry gas reserves.

PennEast has executed long-term, binding precedent agreements[6] with 12 shippers to deliver new natural gas to markets in New Jersey, eastern and southeastern Pennsylvania, and surrounding states. The precedent agreements with the Project shippers account for 90 percent of the Project capacity of 1.1 MMDth/d. The 12 Project shippers include:

- New Jersey Natural Gas Company;
- Public Service Enterprise Group (PSEG) Power LLC;
- Texas Eastern Transmission;
- South Jersey Gas Company;
- Consolidated Edison Company;
- Pivotal Utility Holdings, Inc. (d/b/a Elizabethtown Gas);
- UGI Energy Services, LLC;
- Cabot Oil & Gas Corporation;
- Talen Energy Marketing, LLC;
- Enerplus Resources (USA) Corporation;
- Warren Resources, Inc.; and
- NRG REMA LLC

Under section 7(c) of the NGA, the Commission determines whether interstate natural gas transportation facilities are in the public convenience and necessity and, if so, grants a Certificate to construct and operate them. The FERC's Certificate Policy Statement7 provides guidance as to

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[6] A precedent agreement is a binding contract under which one or both parties have the ability to terminate the agreement if certain conditions such as receipt of regulatory approvals, are not met.
[7] The Policy Statement can be found on our website at http://www.ferc.gov/legal/maj-ord-reg/PL99-3-000.pdf. Clarifying statements can be found by replacing "000" in the URL with "001" and "002."

how the Commission evaluates proposals for new construction, and establishes criteria for determining whether there is a need for a proposed project and whether it would serve the public interest. Decisions are based on technical competence, financing, rates, market demand, gas supply, environmental impact, long-term feasibility, and other issues concerning a proposed project. The Commission's goal is to give appropriate consideration to the enhancement of competitive transportation alternatives, the possibility of overbuilding, subsidization by existing customers, the applicant's responsibility for unsubscribed capacity, the avoidance of unnecessary disruptions of the environment, and the unneeded exercise of eminent domain in evaluating new pipeline construction. The Commission does not direct the development of the gas industry's infrastructure regionally or on a project-by-project basis, or redefine an applicant's stated purpose.

1.2 PURPOSE AND SCOPE OF THIS EIS

Our[8] principle purposes for preparing the EIS are to:

- identify and assess the potential impacts on the natural and human environment that would result from the implementation of the proposed Project;
- describe and evaluate reasonable alternatives to the proposed Project that would avoid or minimize adverse effects on the environment;
- identify and recommend specific mitigation measures, as necessary, to minimize environmental impacts; and
- encourage and facilitate involvement by the public and interested agencies in the environmental review process.

The topics addressed in the EIS include alternatives; geology; soils; groundwater; surface waters; wetlands; vegetation; wildlife and aquatic resources; special status species; land use, recreation, special interest areas, and visual resources; socioeconomics (including transportation and traffic); cultural resources; air quality and noise; reliability and safety; and cumulative impacts. The EIS describes the affected environment as it currently exists, addresses the environmental consequences of the Project, and compares the Project's potential impacts on those of the alternatives. The EIS also presents our conclusions and recommended mitigation measures for the Project.

1.2.1 Federal Energy Regulatory Commission

The FERC is an independent federal agency responsible for evaluating applications for authorization to construct and operate interstate natural gas pipeline facilities. If the Commission determines that a project is required by the public convenience and necessity, Certificate is issued under section 7(c) of the NGA and Part 157 of the Commission's regulations. As such, the FERC is the lead federal agency for the preparation of the EIS in compliance with the requirements of NEPA, the Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA (Title 40 Code of Federal Regulations [CFR] Parts 1500-1508 [40 CFR 1500-1508]), and the FERC's regulations implementing NEPA (18 CFR 380).

The EIS presents our review of the potential environmental impacts and reasonable recommendations to avoid or mitigate impacts. This EIS will be used as an element in the

[8] "We," "us," and "our" refer to the environmental staff of the FERC's Office of Energy Projects.

Commission's review of the Project to determine whether a Certificate would be issued. The FERC will also consider non-environmental issues in its review of PennEast's application. A Certificate will be granted if the Commission finds that the evidence produced on financing, rates, market demands, gas supply, existing facilities and service, environmental impacts, long-term feasibility, and other issues demonstrates that the Project is required by the public convenience and necessity. Environmental impact assessment and mitigation development are important factors in the overall public interest determination.

1.2.2 U.S. Army Corps of Engineers

The USACE is a federal agency within the U.S. Department of Defense with jurisdictional authority pursuant to Section 404 of the Clean Water Act (CWA) (Title 33 of the United States Code [USC], section 1344 [33 USC 1344]), which governs the discharge of dredged and/or fill material into waters of the United States. Section 10 of the Rivers and Harbors Act (RHA) (33 USC 403) regulates any work or structures that potentially affect the navigable capacity of a navigable waterbodies. In addition, Section 408, under Section 14 of the Rivers and Harbors Act, provides that any proposed modification to an existing USACE public works project. Because the USACE would need to evaluate and approve several aspects of the Project, consisting of two separate permits, and must comply with the requirements of NEPA before issuing permits under the above statutes, it has elected to participate as a cooperating agency in the preparation of this EIS. The USACE would adopt the EIS per 40 CFR 1506.3 if, after its independent review of the document, it concludes that the EIS satisfies the USACE's comments and recommendations. The Project occurs within the Philadelphia and Baltimore Districts of the USACE.

The primary decisions to be addressed by the USACE include:

- issuance of a Section 404 permit for aquatic resource impacts associated with construction of the Project;
- issuance of Section 10 permit for construction activities within navigable waters of the United States; and
- authorization under Section 408 for the crossing of two USACE public works projects.

This EIS contains information needed by the USACE to reach decisions on these issues. Through the coordination of this document, the USACE would obtain the views of the public and natural resource agencies prior to reaching decisions on the Project.

As an element of its review, the USACE must consider whether a proposed project avoids, minimizes, and compensates for impacts on existing aquatic resources, including wetlands, to strive to achieve the national regulatory goal of net loss of values and functions. Based on its participation as a cooperating agency and its consideration of the final EIS (including responses to public comments), the USACE would issue a Record of Decision to formally document its decision on the proposed action.

1.2.3 U.S. Environmental Protection Agency

The EPA is an independent federal agency responsible for protecting human health and safeguarding the natural environment. The EPA has delegated water quality certification, under Section 401 of the CWA, to the jurisdiction of individual state agencies. The EPA may assume

Section 401 authority if no state program exists, if the state program is not functioning adequately, or at the request of the state. The EPA also oversees the issuance of a National Pollutant Discharge Elimination System (NPDES) permit by the state agency, under Section 402 of the CWA, for point-source discharge of water used for hydrostatic testing of pipelines into waterbodies. The EPA also has the authority to review and veto permits issued by the USACE under Section 404 of the CWA. In addition to its authority under the CWA, the EPA also has jurisdictional authority under the Clean Air Act (CAA) to control air pollution by developing and enforcing rules and regulations for all entities that emit toxic substances into the air. Under this authority, the EPA has developed regulations for major sources of air pollution, and has delegated the authority to implement these regulations to state and local agencies. State and local agencies are allowed to develop and implement their own regulations for non-major sources of air pollutants. The EPA also establishes general conformity applicability thresholds that a federal agency can utilize to determine whether a specific action requires a general conformity assessment.

In addition to its permitting responsibilities, the EPA is required under Section 309 of the CAA to review and publically comment on the environmental impacts of major federal actions including actions that are subject of draft and final EISs, and is responsible for implementing certain procedural provisions of NEPA (e.g., publishing Notices of Availability of the draft and final EISs in the *Federal Regist*er) to establish statutory timeframes for the environmental review process.

1.2.4 U.S. Fish and Wildlife Service

The FWS has responsibilities under the Endangered Species Act of 1973 (ESA), Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA). The FWS also has special expertise regarding effects on fish and wildlife and other environmental values and work to conserve, protect, and recover species under the ESA. The FWS will use its role as a cooperating agency to assist in the creation of an environmentally acceptable project.

1.2.5 U.S. Department of Transportation – Pipeline and Hazardous Materials Safety Administration

PHMSA is the federal agency responsible for administering the national regulatory program to ensure the safe transportation of natural gas, petroleum, and other hazardous materials by pipeline under 49 USC Chapter 601. PHMSA's Office of Pipeline Safety (OPS) develops regulations and other approaches to risk management to ensure safety in design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. The OPS is responsible for ensuring that PennEast's proposed facilities are designed, constructed, and operated in compliance with the safety standards that the agency has established for natural gas pipeline facilities.

1.2.6 U.S. Department of Agriculture – Natural Resource Conservation Service

On April 27, 1935 Congress passed Public Law 74-46, in which it recognized that "the wastage of soil and moisture resources on farm, grazing, and forest lands ... is a menace to the national welfare" and established the Soil Conservation Service (SCS) as a permanent agency in the U. S. Department of Agriculture (USDA). In 1994, SCS's name was changed to the NRCS which is charged with helping America's farmers, ranchers and forest landowners conserve the nation's soil, water, air and other natural resources. In a letter to the Commission dated February

22, 2016, the NRCS requested cooperating agency status should the proposed pipeline cross any NRCS easement holdings. Though not a permitting agency, the NRCS will ensure that the impact of the proposed Project on NRCS acquired easement holdings is fully and adequately considered.

1.3 PERMITS, APPROVALS, AND REGULATORY REQUIREMENTS

As the lead federal agency for the Project, the FERC is required to comply with Section 7 of the ESA, the MBTA, the Magnuson-Stevens Fishery Conservation and Management Act (MSA) of 1976, the RHA, the CWA, the CAA, Section 106 of the National Historic Preservation Act (NHPA). These and other statutes have been taken into account in the preparation of the EIS.

Table 1.3-1 lists the major federal, state, and local permits, approvals, and consultations for construction and operation of the Project. The table also provides each permit status. The FERC encourages cooperation between applicants and state and local authorities, but this does not mean that state and local agencies, through applications of state and local laws, may prohibit or unreasonably delay the construction or operation of facilities approved by the FERC. Any state or local permits issued with respect to jurisdictional facilities must be consistent with the conditions of any authorization issued by the FERC.

TABLE 1.3-1

Required Environmental Permits, Approvals, and Consultations for the Project

Agency	Permit/Approval	Status
FEDERAL		
U.S. Army Corps of Engineers – Philadelphia and Baltimore Districts	Clean Water Act Section 404, Rivers and Harbors Act Section 10, and Title 33 Section 408 Approvals	Initial consultation letter sent 8/12/2014. Introduction and coordination meeting held 10/30/14. Updated route materials sent 7/24/15. Pre-application meetings held 7/13/2015, 7/16/2015, and 12/17/15. Field verifications commenced November 2015 and ongoing. Applications for joint permit submitted 2/5/2016. USACE received permit 6/3/2016.
U.S. Fish and Wildlife Service –Pennsylvania	Endangered Species Act, Section 7 Consultation and Clearance	Initial consultation letter sent 8/12/2014. Introduction and coordination meeting held 10/29/14. Updated route materials sent 7/24/15. Rare, Threatened, and Endangered (RTE) species survey coordination meeting held 4/22/15. Species report submitted 10/7/2015.
U.S. Fish and Wildlife Service – New Jersey	Endangered Species Act, Section 7 Consultation and Clearance	Initial consultation letter sent 8/12/2014. Consultation discussions ongoing. Updated route materials sent 7/24/15. RTE survey coordination meeting held 4/23/15. Species report submitted 10/7/2015.
National Marine Fisheries Service (NOAA Fisheries)	Endangered Species Act, Section 7 Consultation and Clearance	Initial consultation letter sent 8/12/2014. Response received stating that no threatened or endangered species under the jurisdiction of the NOAA Fisheries are known to occur in the Project area, and no further consultation is necessary. Updated route materials sent 7/24/15 and 10/1/15. Follow-up consultation on 12/8/15 and ongoing.

TABLE 1.3-1

Required Environmental Permits, Approvals, and Consultations for the Project

Agency	Permit/Approval	Status
National Park Service (NPS)	NPS Consultation and Clearance for National Natural Landmarks, National Trails, and National Historic Sites	Initial consultation letter sent 8/12/2014. Introduction and coordination meeting with National Wild and Scenic Rivers Program managers held 10/1/14. Updated route materials sent 7/24/15. Held conference call on Appalachian Trail crossing on 8/11/15. Conference call regarding the crossing location of the Appalachian Trail on 2/23/16. Ongoing
National Resources Conservation Service (NRCS)	NRCS Consultation	Initial coordination meeting held 3/18/15. Joint agriculture community meeting held 6/2/15. Updated route materials sent 7/24/15.
STATE – PENNSYLVANIA		
Pennsylvania Department of Environmental Protection (PADEP) (Northeast and Southeast Regional Offices)	Water Obstruction and Encroachment Permits Submerged Lands License Agreements Section 401 Water Quality Certification Erosion and Sediment Control General Permit (ESCGP-2) Hydrostatic Testing Discharge General Permits (PAG-10) Plan Approval and Operating Permit for a Non-Major Source	Initial consultation letter sent 8/12/2014. Coordination meeting held 11/19/14. Updated route materials sent 7/24/15. Pre-application meeting held 7/13/15 and 12/17/15. Encroachment Permit Applications, Submerged Lands License Agreements, and Section 401 Water Quality Certification Application submitted 2/5/2016.
Pennsylvania Game Commission (PGC)	state RTE Species Consultation and Clearance	Initial consultation letter sent 8/12/2014. Introduction and coordination meeting held 9/25/14. Special Use Permits for surveys on PGC lands issued 9/2014. Updated route materials sent 7/24/15. Appalachian Trail crossing meetings held 5/21/15 and 8/27/15. Species report submitted 10/7/15 and 11/10/15. Ongoing.
Pennsylvania Fish and Boat Commission (PFBC)	state RTE Species Consultation and Clearance Permit for Use of Explosives in Commonwealth Waters Aid to Navigation Plan Approval	Initial consultation letter sent 8/12/2014. Introduction and coordination meetings held 11/4/14 and 11/24/14. Updated route materials sent 7/24/15, 10/1/15, and 12/17/15. Species reports submitted 10/7/15 and 11/10/15. PFBC RTE Consultation responses received by PennEast 11/5/15 and 12/10/15. RTE species survey and land use consultations ongoing.
Pennsylvania Department of Conservation and Natural Resources (PADCNR)	State RTE Species Consultation and Clearance	Initial consultation letter sent 8/12/2014. Introduction and coordination meetings held 11/4/14 and 11/24/14. Updated route materials sent 7/24/15 and 10/1/15. Special Use Permits for surveys on state park lands issued 4/8/15. Species report submitted 10/7/15. PADCNR responses received by PennEast 10/22/15. Consultations ongoing.

TABLE 1.3-1 Required Environmental Permits, Approvals, and Consultations for the Project		
Agency	**Permit/Approval**	**Status**
Pennsylvania Historical and Museum Commission (PHMC)	Section 106, NHPA Consultation	Initial consultation letter received 08/21/2014. Consultations ongoing. Updated route materials sent 7/24/15 and 10/1/15. Phase I Archeological Report and Historical Reconnaissance Report submitted 9/23/15. PHMC responses received 10/21/15 and 10/22/15. Updated route materials sent 12/17/2015. Phase I Archaeological Report copies sent 1/12/2016. Phase I Archaeological Report Addendum 1 to be submitted March 2016. Consultations ongoing.
STATE – NEW JERSEY		
New Jersey Department of Environmental Protection (NJDEP), Division of Land Use Regulation	New Jersey Freshwater Wetlands Letter of Interpretations and Individual Permit, includes Federal wetlands certification New Jersey Flood Hazard Area Verifications and Individual Permit	Initial consultation letter sent 8/12/2014. Introduction and coordination meeting held 9/23/14. Interagency coordination meeting held 12/2/14. Updated route materials sent 7/24/15, 10/1/15, and 12/17/15. Consultation and pre-application meetings held 7/2/15, 7/30/15, 8/4/2015, 8/5/2015, 8/19/2015, 9/2/2015, 9/8/2015, 9/10/2015, 9/16/20159/30/15, 10/8/15, 10/14/15, 10/22/15, 10/28/15, 11/25/15, 12/9/15, 12/17/15, 1/6/15, 1/7/15, 1/11/16, 1/20/16, and 2/3/16
NJDEP, Green Acres Program	New Jersey Green Acres Minor/Major Diversion	Initial consultation letter sent 8/12/2014. Introduction and coordination meeting held 9/23/14. Interagency coordination meeting held 12/2/14. Updated route materials sent 7/24/15 and 12/17/15. Consultation meeting held 7/2/15, 9/10/15, 10/22/15, 12/17/15, and 1/7/16.
NJDEP, Division of Air Quality	Air Quality General Permits, including Federal Air Permits	To be scheduled prior to construction.
NJDEP, Division of Water Resources	Discharge to Surface Water Permit Water Allocation Permit NJDEP General Permit No. 5G3 (NJ0088323) for Stormwater Discharge Associated with Construction Activity	Applicability will be determined as Project design advances.
Delaware and Raritan Canal Commission	Certificate of Approval	Applicability will be determined as Project design advances. Will be reviewed independently and hold separate hearings.
New Jersey Historic Preservation Office (New Jersey SHPO)	National Historic Preservation Act, Section 106 Consultation and Clearance	Initial consultation letter sent 8/19/2014. Introduction and coordination meeting held 9/16/14. Interagency coordination meeting held 12/2/14. Updated route materials sent 7/24/15. Revised archaeological sensitivity model accepted 4/8/15. Updated route materials sent 12/17/15. Consultation ongoing.
New Jersey State Agriculture Development Committee	New Jersey Farmland Preservation Program Consultation	Introductory meeting held 9/12/14. Interagency coordination meeting held 12/2/14. Updated route materials sent 7/24/15. Joint agricultural community meeting held 6/2/15.

TABLE 1.3-1 Required Environmental Permits, Approvals, and Consultations for the Project		
Agency	**Permit/Approval**	**Status**
COUNTY		
Luzerne Conservation District	Erosion and Sediment Control General Permit (ESCGP-2) Technical Review	Initial consultation letter sent 8/21/2014. Pre- application meeting held 7/13/15 and 12/17/15. Updated route materials sent 7/24/15 and 10/1/15.
Carbon County Conservation District	Erosion and Sediment Control General Permit (ESCGP-2) Technical Review	Initial consultation letter sent 8/21/2014. Pre- application meeting held 7/13/15 and 12/17/15. Updated route materials sent 7/24/15 and 10/1/15.
Northampton County Conservation District	Erosion and Sediment Control General Permit (ESCGP-2) Technical Review	Initial consultation letter sent 8/21/2014. Pre- application meeting held 7/13/15 and 12/17/15. Updated route materials sent 7/24/15 and 10/1/15.
Bucks County Conservation District	Erosion and Sediment Control General Permit (ESCGP-2) Technical Review	Initial consultation letter sent 8/21/2014. Pre- application meeting held 7/13/15 and 12/17/15. Updated route materials sent 7/24/15 and 10/1/15.
Hunterdon County Conservation District	Soil Erosion and Sediment Control (SESC) Plan Certification	Initial consultation letter sent 8/21/2014
Mercer County Conservation District	Soil Erosion and Sediment Control (SESC) Plan Certification	Initial consultation letter sent 8/21/2014
WATERSHED-SPECIFIC REGULATORY AUTHORITIES		
Delaware River Basin Commission (DRBC)	Water Withdrawal Approval and Project Review	Initial consultation letter sent 8/21/2014. Introduction and coordination meeting held 9/3/14. Updated route materials sent 7/24/15, 10/1/15, and 12/17/15. Pre-application meeting held 7/13/15, 12/2/15, and 1/19/16. Application submitted 2/5/16.
Susquehanna River Basin Commission (SRBC)	Water Withdrawal Approval if more than 100,000 gallons per day averaged over 30 days	Initial consultation letter sent 8/21/2014. Introduction and coordination meeting held 11/6/14. Updated route materials sent 7/24/15, 10/1/15, and 12/17/15.

1.3.1 Federal Pemits

1.3.1.1 Clean Water Act and Rivers and Harbors Act

The CWA, as amended, regulates the discharges of pollutants into the waters of the United States and regulated water quality standards for surface waters. To enact this goal both the EPA and the USACE have regulatory authority under this statute. The EPA has implemented pollution control programs including setting wastewater standards for industry and creating water quality standards for all contaminates in surface waters. Under the CWA, it is unlawful to discharge any pollutant from a point source into waters of the United States without a permit. The EPA operates the NPDES permit program that regulates discharges by industrial, municipal, and other facilities, if discharges directly enter surface waters. Section 404 of the CWA regulates the discharge of dredged and/or fill material into waters of the United States, including jurisdictional wetlands, and is under the jurisdiction of the USACE.

The RHA pertains to activities in navigable waters of the United States as well as harbor and river improvements. Section 10 of the RHA prohibits the unauthorized obstruction or alteration of any navigable water of the United States. Construction of any structure or the accomplishments of any other work affecting course, location, condition, or physical capacity of waters of the United States must be authorized by the USACE. The Project would cross three navigable waters: Susquehanna River and Lehigh River in Pennsylvania and the Delaware River in New Jersey.

According to 33 USC 408, there shall be no temporary or permanent alteration, occupation or use of any public works including but not limited to levees, sea walls, bulkheads, jetties, and dikes for any purpose without the permission of the Secretary of the Army. Under the terms of 33 USC 408, any proposed modification requires a determination by the Secretary that such proposed alteration or permanent occupation or use of a federal project is not injurious to the public interest and will not impair the usefulness of such work.

Section 401 of the CWA requires that an applicant for a federal permit who conducts any activity that may result in a discharge to waters of the United States must provide the federal regulatory agency with a Section 401 certification. Section 401 certifications are delegated to states in which the discharge originates and declares that the discharge would comply with applicable provisions of the act, including the state water quality standards. The Pennsylvania Department of Environmental Protection (PADEP) and New Jersey Department of Environmental Protection (NJDEP) are the regulatory authorities delegated with Section 401 certification for the states of Pennsylvania and New Jersey, respectively.

1.3.1.2 Clean Air Act

The CAA, as amended, defines the EPA's responsibilities for protecting and improving the nation's air quality and the stratospheric ozone layer. Under the CAA, the EPA sets limits on certain air pollutants and grants them authority to limit emissions of air pollutants coming from sources such as industrial facilities. The EPA has delegated authority to implement these regulations to state and local agencies.

1.3.1.3 Endangered Species Act

Section 7 of the ESA, as amended, states that any project authorized, funded, or conducted by a federal agency (e.g., FERC) should not "…jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined…to be critical…" (16 USC Section 1536(a)(2)(1988)). The FERC, or PennEast as a non-federal party, is required to consult with the FWS and the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NOAA Fisheries) to determine whether any federally listed or proposed endangered or threatened species or their designated critical habitat occur in the vicinity of the Project. If the FERC determines that these species or habitats may be impacted by the Project, the FERC is required to prepare a Biological Assessment (BA) to identify the nature and extent of adverse impact, and to recommend measures to avoid or reduce potential impacts on habitat and/or species. If, however, the FERC determines that no federally listed or proposed endangered or threatened species or their designated critical habitat would be impacted by the Project, no further action is necessary under the ESA.

1.3.1.4 Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act

The MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the U.S. Department of the Interior. The BGEPA prohibits harming eagles, their nests, and/or eggs.

Executive Order (EO) 13186 (66 *Federal Register* 3853) directs federal agencies to identify where unintentional take is likely to have a measurable negative effect on migratory bird populations and to avoid or minimize adverse impacts on migratory birds through enhanced collaboration with the FWS. EO 13186 states that emphasis should be placed on species of concern, priority habitats, and key risk factors, and that particular focus should be given to addressing population-level impacts. On March 30, 2011, the FWS and the Commission entered into a *Memorandum of Understanding Between the Federal Energy Regulatory Commission and the U.S. Department of the Interior United States Fish and Wildlife Service Regarding Implementation of Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds"* (MOU). The MOU outlines a collaborative approach to promoting the conservation of migratory bird populations and furthering implementation of the migratory bird conventions, the MBTA, and the BGEPA.

1.3.1.5 Magnuson-Stevens Fishery Conservation and Management Act

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), establishes procedures designed to identify, conserve, and enhance essential fish habitat (EFH) for those species regulated under the federal fisheries management plan. The MSA requires federal agencies to consult with NOAA Fisheries on all actions or proposed actions authorized, funded, or undertaken by the agency that may adversely impact EFH (MSA Section 305(b)(2)). Although absolute criteria have not been established for conducting EFH consultations, NOAA Fisheries recommends consolidating EFH consultations with interagency coordination procedures required by other statutes such as NEPA, the Fish and Wildlife Coordination Act, or the ESA (50 CFR 600.920€) in order to reduce duplication and improve efficiency. The Project would not cross any EFH as defined by the MSA.

1.3.1.6 National Historic Preservation Act

Section 106 of the NHPA, as amended, requires the FERC to take into account the impacts of its undertakings on historic properties, and afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment. Historic properties include prehistoric or historic sites, districts, buildings, structures, objects, or properties of traditional religious or cultural importance listed in or eligible for listing in the National Register of Historic Places (NRHP). In accordance with the ACHP's regulations for implementing Section 106, 36 CFR 800.2(a)(3), the FERC is using the services of PennEast and its consultant to prepare information, analyses, and recommendations. However, we remain responsible for all findings and determinations. We will follow the process of complying with Section 106 outlined in Part 800 by consulting with each state's State Historic Preservation Office (SHPO), identifying historic properties in the area of potential effect (APE), and assessing potential Project effects.

1.3.1.7 Delaware River Basin Commission

It is the Delaware River Basin Commission's (DRBC) responsibility to develop and implement plans, policies, and projects relating to the water resources of the Delaware River Basin. The DRBC adopts and promotes uniform and coordinated policies for water conservation, control, use, and management in the Delaware River Basin. The DRBC encourages the planning, development and financing of water resources projects according to such plans and policies.

A permit is required from the DRBC if:

- a withdrawal from a single well or a group of wells operated as a system equal to or exceeding a daily average gross of 100,000 gallons per day (gpd), for any purpose, outside of the Southeastern Pennsylvania Ground Water Protected Area;
- a withdrawal from a surface water source in excess of a daily average gross of 100,000 gpd, for any purpose;
- a withdrawal from a single well or group of wells operated as a system in excess of a daily average gross of 10,000 gpd, for any purpose, within the Southeastern Pennsylvania Ground Water Protected Area. The Delaware River Basin Commission Ground Water Protected Area Regulations: Southeastern Pennsylvania is available on the DRBC website at http://www.nj.gov/drbc/gwpapage.htm;
- an increased ground and/or surface water withdrawal, regardless of the quantity proposed for a project previously approved by the DRBC;
- a renewal of an existing withdrawal previously approved by the DRBC; and
- a diversion or transfer of water into or out of the Delaware River Basin with a design capacity in excess of a daily average rate of 100,000 gallons.

The DRBC has Administrative Agreements with the Commonwealth of Pennsylvania and the states of Delaware, New Jersey, and New York. Each of the states has unique filing requirements which must be met in addition to requirements of the DRBC.

1.3.1.8 Susquehanna River Basin Commission

The Susquehanna River Basin Commission (SRBC) is a regional governmental agency whose purpose is to effect comprehensive multiple purpose planning for the conservation, utilization, development, management, and control of the water and related natural resources of the Susquehanna River Basin. The SRBC has broad authority to carry out basinwide planning programs and projects, and to take independent action as it determines essential to fulfill its statutory regional governmental role. The project review regulations can be found at 18 CFR Parts 801, 806, 807 and 808, which contain the standards and procedures used by the SRBC for the review and approval of water resources projects, and for related enforcement and oversight activities.

The SRBC has a limited role in the regulation of natural gas development, namely the regulation of water withdrawals and consumptive water uses. Prior approval from the SRBC through an application process is required for water withdrawals and consumptive uses for natural gas development. All surface water and groundwater withdrawal applications are acted on by the SRBC's commissioners during their quarterly business meetings.

1.4 PUBLIC REVIEW AND COMMENT

1.4.1 Notices and Meetings

PennEast requested authorization to utilize the Commission's NEPA Pre-Filing Review Process for its Project on October 7, 2014. The Commission approved PennEast's request on October 10, 2014 and established a pre-filing Docket Number (PF15-1-000) to place information related to the Project into the public record.

In November 2014, PennEast held five open house meetings in Pennsylvania and New Jersey to provide information on the Project and solicit feedback from stakeholders on environmental issues and other concerns. We participated in these open house meetings, provided information on the Commission's environmental review process for the Project, and took comments about the Project.

On January 13, 2015, FERC issued a *Notice of Intent (NOI) to Prepare an Environmental Impact Statement for the Planned PennEast Pipeline Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Meetings*. On January 21, 2014, in the pre-filing docket, we issued a *Notice of Extension of Comment Period and Clarification of Location of Public Comment Meetings for the PennEast Pipeline Project*. Public scoping meetings were held from February 10-12 and 25-26, 2015 in Bethlehem, Northampton County, Pennsylvania; Jim Thorpe, Carbon County, Pennsylvania; Wilkes-Barre, Luzerne County, Pennsylvania; Trenton, Mercer County, New Jersey; and Hampton, Hunterdon County, New Jersey. FERC sent an additional scoping letter on August 19, 2015 to landowners affected by the significant route modifications and opened a 30-day comment period. The distribution list is included in appendix A.

We participated in interagency meetings, bi-weekly conference calls, and a site review and flyover for the Project to identify issues to be addressed in the EIS. The meetings, conference calls, and site visit provided a forum for the exchange of information and supported the FERC's responsibility to coordinate federal authorizations and associated environmental review of the Project. Summaries of the bi-weekly conference calls are available for viewing on the FERC's eLibrary website (www.ferc.gov).[9]

1.4.2 Scoping Comments

We have received comments on a wide variety of environmental issues for the Project. To date, we have received 11,565 specific comments from 3,960 comment letters. Comments have been received from federal agencies (20 comment letters), state agencies (52 comment letters), local agencies (176 comment letters), companies and organizations (273 comment letters), and individuals/stakeholders (3,439 comment letters). We have also received 1,663 requests for intervenor status.

The most frequently received comments concern topics on loss of property value, added responsibility for small emergency response teams, arsenic release into groundwater from blasting

[9] Public meeting transcripts and comment letters are available for viewing on the FERC website (http://www.ferc.gov). Using the "eLibrary" link, select "General Search" from the eLibrary menu, enter the selected date range and "Docket No." excluding the last three digits (i.e., PF15-1 or CP15-558), and follow the instructions. For assistance, call 1-866-208-3676, or email FERCOnlineSupport@ferc.gov.

and continuing after construction due to methane leaks, limited evacuation routes for local residents, impacts on state-classified designated waters and rivers, long-term impacts of operating compressor stations on human health and the environment (noise, light, and air pollution); impacts on farms (reduced crop yields, loss of organic designations), impacts on the ecologically important Sourland region, forest fragmentation, crossing conservation land and easements, destruction of habitat important to a number of threatened and endangered species, potential impacts on infrastructure such as water systems and sewers, and construction in areas with potential archeological sites, sinkholes and karst. Scoping comments are addressed throughout this EIS, where applicable, as indicated in table 1.4-1.

TABLE 1.4-1

Summary of Scoping Comment Topics

Topic	DEIS Sections
General	
Public meetings	1.4.1
Purpose and Need	
Supply, demand, and project goals	1.1
Purpose and need of project	1.1
Natural gas market	1.2.1
Alternatives	
No action alternative	3.1
Improving existing pipelines	3.3.1
Locating the pipeline along existing rights-of-way such as highways	3.4.1
Alternative waterbody crossing methods	4.3.2.4
Geology	
Arsenic Release from blasting and fugitive emissions	4.1.5.5
Seismic activity	4.1.5.1
Karst	4.1.5, 4.1.5.4, 4.1.7
Blasting dangers	4.1.6
Abandoned mine shafts	4.1.5.4
Soils and Sediments	
Compaction due to construction	4.2.1.1, 4.2.2.2, 4.2.2.3
Erosion	4.2.2.1
Prime agricultural soils	4.2.2.2
Soil horizon disruption	4.2.2.2
Contaminated soil disturbance	4.2.1.5
Topsoil loss	4.2.2.2
Organic farms	4.7.1.5
Water Resources	
Sedimentation	4.3.1.8
Run-off	4.3.1.8, 4.3.2.6
Aquifer integrity	4.3.1.4, 4.3.1.8
River crossings	4.3.2.3
Groundwater contamination	4.3.1.7
State-classified designated waterways	4.3.2.2

TABLE 1.4-1 Summary of Scoping Comment Topics	
Topic	**DEIS Sections**
Municipal water supplies	4.3.1.5
Private water supplies	4.3.1.5
Scenic Rivers Act	4.3.2.2
Delaware River Basin Commission regulations	1.3.1.7
Vegetation	
Edge effects	4.5.1.2, 4.5.2.2
Riparian vegetation	4.3.2.2
Wetlands	
Avoid/minimize impacts	4.4.3
Changes in water flow	4.4.3
Assess ecological function and value of impacted areas	4.4.3
Need for buffer zones	4.3.3.2
Restoration	4.4.3
Replacement	4.4.3
Fish and Wildlife	
Trout	4.3.3.1
Interior Forest Species	4.5.2.1
Overabundance of Deer	4.5.2.1
Right-of-Way Habitat Modification	4.5.1.2
Threatened and Endangered Species	4.6
Unique Habitat Destruction	4.5.2.1
Land Use	
Preserved land	4.7.5.2, 4.7.5.3
Eminent domain	4.7.2
Property values	4.8.8.1
Public land	4.7.5
Recreation	
Hunting	4.7.5.1, 4.7.5.2
Water sports	4.7.5.1, 4.7.5.2
Hiking trails	4.7.5.1, 4.7.5.2
Tourism	4.7.5.1, 4.7.5.2
Visual	
Creation of right-of-way	4.7.7.1
Compressor station appearance and light emissions	4.7.7.2
Socioeconomics	
Job creation and job permanence	4.8.2
Loss and degradation of property assets	4.8.8.1
Tax base impacts	4.8.9
Cultural	
Historic homes, farms, and battlefields	4.9.2
Damage on undiscovered artifacts	
Native American sites	4.9.1

TABLE 1.4-1 Summary of Scoping Comment Topics	
Topic	**DEIS Sections**
Air Quality	
Clean Air Act	4.10.1
Fugitive emissions	4.10.1.4
Compressor station emissions	4.10.1.4
Noise	
Compressor station noise	4.10.2.3
Construction noise	4.10.2.2, 4.10.2.3
Reliability and Safety	
Risk of explosion	4.11
Proximity of pipeline to schools, churches, hospitals, and residences	4.11.1
Hospital access during construction	4.11.1
Burden on local emergency response teams	4.11.1
Pipeline strikes	4.11.1
Unfairness of using thinner pipelines in rural areas	4.11.1
Terrorism	4.11.4
Cumulative Impacts	
Scope of environmental assessment	4.12
Multiple crossings of waterbodies	4.12.2
Climate change	4.12.8
Mitigation	
Spill Prevention	4.3.1
Habitat replacement	4.5
Crop loss compensation	4.8.1.5

1.4.3 Comments Outside the Scope of This EIS

We have received several comments during the scoping process expressing concern that the Project would be used to export natural gas. PennEast is not constructing the Project for the purpose of supporting the export of natural gas from the United States. As discussed above, PennEast is proposing to transport natural gas to meet the demand for natural gas in markets in New Jersey, eastern and southeastern Pennsylvania, and surrounding states. Specifically, PennEast is proposing to construct the Project based on commitments from Project shippers, as identified in section 1.1, which have statutory, regulatory, and/or contractual obligations to serve natural gas customers within their respective service areas.

We received comments that Marcellus Shale production activity should be included in the scope of the proposed Project. The Project does not include the production of natural gas. The scope of this EIS focuses on the natural gas transmission facilities that PennEast would construct and operate. Our authority under the NGA and NEPA review requirements relates only to natural gas facilities that are involved in interstate commerce. Thus, the facilities associated with the production of natural gas are not under FERC jurisdiction.

Commenters also noted that the EIS should address the indirect impacts of induced Marcellus Shale development. Impacts that may result from additional shale gas development are not "reasonable foreseeable" as defined by the CEQ regulations. Nor is such additional developments, or any correlative potential impacts, an "effect" of the Project, as contemplated by the CEQ regulations, for purposes of a cumulative impact analysis. The development of Marcellus Shale, which is regulated by states, continues to drive the need for takeaway interstate pipeline capacity to allow the gas to reach markets. Therefore, companies are planning and building interstate transmission facilities in response to this source of gas supply. In addition, many production facilities have already been permitted and/or constructed in the region, creating a network through which natural gas may flow along various pathways to local users or the interstate pipeline system. PennEast would receive natural gas through its interconnection with other natural gas pipelines and we cannot estimate how much of the Project volumes would come from current/existing shale gas production and how much, if any, would be new production "attributable" to the Project.

The Project does not depend on additional shale gas production that may occur for reasons unrelated to the Project and over which the Commission has no control, such as state permitting for additional gas wells. An overall increase in production of shale gas may occur for a variety of reasons, but the location and subsequent production activity is unknown and too speculative to assume based on the interconnected interstate natural gas pipeline system. Accordingly, the factors necessary for a meaningful analysis of when, where, and how shale gas development would occur are unknown at this time. It is simply impractical for this EIS to consider impacts associated with additional shale gas development in separate geographic areas than the proposed Project because cumulative impacts resulting from the Project must, under CEQ regulations, be meaningfully analyzed by this Commission.

1.5 NONJURISDICTIONAL FACILITES

Under section 7 of the NGA, the FERC is required to consider, as part of its decision to authorize interstate natural gas facilities, all factors bearing on the public convenience and necessity. Occasionally, proposed projects have associated facilities that do not come under the jurisdiction of the FERC. These "nonjurisdictional" facilities may be integral to the project objective (e.g., a new or expanded power plant that is not under the jurisdiction of the FERC at the end of a pipeline) or they may be merely associated as minor, non-integral components of the jurisdictional facilities that would be constructed and operated with the proposed facilities (e.g., a meter station constructed by a customer of the pipeline to measure gas off-take).

PennEast has indicated that it would require connection to the local electrical distribution grid for power to the MLVs and M&R stations. In addition, the Kidder Compressor Station would require onsite water and sewer facilities. The other aboveground facilities would also require electrical distribution lines to be run to those facilities.

These facilities are addressed in our cumulative impacts analysis in section 4.12 of this EIS.

2.0 DESCRIPTION OF PROPOSED ACTION

2.1 PROJECT FACILITIES

PennEast proposes to construct a new, 118.8-mile, pipeline system in Pennsylvania and New Jersey. The PennEast Pipeline Project (Project) consists of about 115.1 miles of 36-inch-diameter pipeline, 3.7 miles of three lateral pipelines, a new compressor station, and eight M&R stations. An overview map of the Project location and facilities is provided on figure 1-1. Table 2.1-1 summarizes the proposed facilities associated with the Project. Detailed U.S. Geological Survey (USGS) topographic quadrangle maps showing the pipeline route, laterals, aboveground facilities, and pipe and contractor yards are contained in appendix B. Appendix C contains construction right-of-way cross section diagrams and specialized construction techniques.

2.1.1 Pipeline Facilities

The Project includes about 118.8 miles of pipeline and laterals composed of the following facilities:

- 115.1 miles of new, 36-inch-diameter pipeline extending from Luzerne County, Pennsylvania to Mercer County, New Jersey;
- the 2.1-mile Hellertown Lateral consisting of 24-inch-diameter pipe in Northampton County, Pennsylvania;
- the 0.1-mile Gilbert Lateral consisting of 12-inch-diameter pipe in Hunterdon County, New Jersey; and
- the 1.5-mile Lambertville Lateral consisting of 36-inch-diameter pipe in Hunterdon County, New Jersey.

2.1.2 Aboveground Facilities

Compressor Station

The Kidder Compressor Station would be a new 47,700 total ISO hp facility located on a 60-acre site in Kidder Township, Carbon County, Pennsylvania at milepost (MP) 26.6. The compressor station would be driven by three gas-powered Solar Mars 100 units rated at 15,900 hp each under ISO conditions (47,700 total ISO hp). Other ancillary facilities would include a new natural gas-fired emergency generator and a fuel gas heater.

The compressor station would utilize gas and/or electric engines to maintain pressure within the pipeline in order to deliver natural gas to specific locations at specified pressures. Compressors would be housed in a building that would be designed to attenuate noise and allow for operation and maintenance activities. The compressor station site would include administrative, maintenance, storage, and communications buildings, and metering and pig launcher/receiver facilities discussed below. The compressor station would be housed in a large fenced area within a larger parcel of land. The location of the compressor station was determined primarily by hydraulic modeling.

2.1.3 Other Aboveground Facilities

The Project would also include the construction of eight M&R stations for the Project interconnects, 11 MLV sites, and four pig launcher/receiver sites.

TABLE 2.1-1

Proposed Project Facilities

Facility	Diameter	Length	Begin MP	County, State
Pipeline Facilities				
Mainline	36-inch	115.1	0.0	Luzerne, PA; Carbon, PA; Northampton, PA; Bucks, PA; Hunterdon, NJ; Mercer, NJ
Hellertown Lateral	24-inch	2.1	71.6	Northampton, PA
Gilbert Lateral	12-inch	0.1	79.7	Hunterdon, NJ
Lambertville Lateral	36-inch	1.5	100.6	Hunterdon, NJ
Compressor Station				
Kidder Compressor Station			26.6	Kidder Township, Carbon, PA
Other Aboveground Facilities				
Wyoming Interconnect (Energy Transfer Partners, L.P.)			0.0	Dallas Township, Luzerne, PA
Springville Interconnect (Williams Partner LP)			0.3	Dallas Township, Luzerne, PA
Auburn (UGI Energy Services, LLC) and Leidy Interconnects (Transcontinental Gas Pipeline Company, LLC)			4.4	West Wyoming Borough, Luzerne, PA
Mainline Block Valve 1			8.2	Plains Township, Luzerne, PA
Mainline Block Valve 2			19.6	Bear Creek Township, Luzerne, PA
Mainline Block Valve 3			32.2	Kidder Township, Carbon, PA
Mainline Block Valve 4			46.1	Towamensing Township, Carbon, PA
Mainline Block Valve 5 and Blue Mountain Interconnect (UGI Central Penn Gas, Inc.)			51.0	Lower Towamensing Township, Carbon, PA
Mainline Block Valve 6			56.0	Moore Township, Northampton, PA
Mainline Block Valve 7			62.2	Upper Nazareth Township, Northampton, PA
Hellertown Launcher & Mainline Launcher/Receiver/Mainline Block Valve 8			71.6	Lower Saucon Township, Northampton, PA
TCO (PennEast Gas Transmission, LLC) and UGI- LEH (UGI Utilities, Inc.) Interconnects			HL-2.1	Lower Saucon Township, Northampton, PA
Gilbert Lateral Tap Site/Mainline Block Valve 9			79.7	Holland Township, Hunterdon, NJ
Etown (Elizabethtown Gas) and Gilbert (NRG REMA LLC Gilbert Generating Station) Interconnects			GL-0.1	Holland Township, Hunterdon, NJ
Mainline Block Valve 10			90.1	Kingwood Township, Hunterdon, NJ
Lambertville Launcher Site/Mainline Block Valve 11			100.9/LL-0.0	West Amwell Township, Hunterdon, NJ
Algonquin (Algonquin Gas Transmission, LLC) and TETCO (Texas Eastern Transmission, LP) Interconnects			LL-1.4	West Amwell Township, Hunterdon, NJ
Transco Interconnect (Transcontinental Gas Pipe Line Company, LLC)			113.8	Hopewell Township, Mercer, NJ
Transco Receiver Site			115.1	Hopewell Township, Mercer, NJ

2.1.3.1 Metering and Regulating Stations

M&R stations measure the volume of gas flow from or to a pipeline system. Most M&R stations consist of a small graveled area with small building(s) that enclose the measurement equipment. PennEast has proposed to construct eight M&R stations for the Project interconnects (see table 2.1-1).

2.1.3.2 MLVs

MLVs consist of a small system of aboveground and underground piping and valves that control the flow of gas within the pipeline and can also be used to vacate, or blow-off, the gas within a pipeline segment, if necessary. MLVs would be installed within the operational rights-of-way of the pipeline facilities. MLVs would be located at interconnections within a transmission system (i.e., between a mainline pipeline and a loop) and at locations based on the U.S. Department of Transportation (DOT) Class designation of the pipeline. In general, the distance between MLVs is reduced in areas of higher human population (see section 4.12.1). Locations of MLVs proposed for the Project are included in table 2.1-1.

2.1.3.3 Pig Launchers and Receivers

Launchers and receivers are facilities where internal pipeline cleaning and inspection tools, referred to as "pigs," could be inserted or retrieved from the pipeline. Pig launchers/receivers consist of an aboveground group of piping within the pipeline right-of-way or other aboveground facility boundaries. Table 2.1-1 provides the locations of the pig launchers and receivers.

2.2 LAND REQUIREMENTS

Construction of the Project would impact a total of about 1,613.5 acres of land, including 1,065.2 acres for pipeline facilities (including additional temporary workspace), 110.1 acres for access roads, 372.3 acres for pipe and contractor ware yards, and 31.1 for aboveground facilities. Following construction, about 715.2 acres would be affected by the 50-foot permanent easement for the pipeline and laterals, 8.3 acres for access roads, 0.0 acre for pipe and contractor ware yards, and 26.5 for aboveground facilities during operation. About 34.7 acres would be affected by construction of the Kidder Compressor Station while 34.0 acres would be maintained for operation. The Project would permanently impact about 784 acres during operation.

Table 2.2-1 summarizes land requirements for the PennEast Pipeline Project. A detailed description and breakdown of land requirements and use is presented in section 4.8. Typical right-of-way configurations that reflect the majority of the pipeline and specialized construction techniques are provided as appendix C.

TABLE 2.2-1 Summary of Land Requirements for the PennEast Pipeline Project			
Facility a/		**Land Affected by Construction (acres)**	**Land Affected by Operation (acres)**
Pipeline Facilities			
Mainline		1,032.4	693.6
Hellertown Lateral		17.6	12.5
Gilbert Lateral		1.4	0.8
Lambertville Lateral		13.8	8.3
	Subtotal	**1,065.2**	**715.2**
Compressor Station			
Kidder Compressor Station		**34.7**	**34.0**
Other Facilities			
Access Roads		110.1	8.3
Pipe and Contractor Ware Yards		372.3	0.0
Aboveground Facilities		31.1	26.5
	Subtotal	**513.5**	**34.8**
	Project Total	**1,613.6**	**784.0**

Notes:
a/ Mainline valves would not have separate easements from the pipeline. The impacts identified for mainline valves are also included in impacts identified for the pipeline and are not additive.

2.2.1 Pipeline Facilities

PennEast would create a 100-foot-wide construction right-of-way in upland areas and a 75-foot-wide right-of-way in wetlands. For wetlands and waterbody crossings, residential areas, or other areas where specialized construction techniques would be employed, PennEast would require extra workspaces outside the typical construction right-of-way where additional excavation, soil storage requirements, steep slope construction, bedrock, or equipment management and staging would make it impracticable and unsafe to carry out all construction operations within the 100-foot-wide construction corridor. In agricultural areas where full topsoil segregation of 12 inches is required, PennEast would utilize a 125-foot-wide right-of-way to accommodate excess spoil. Additional temporary workspace (ATWS) needed for the Project would result in about 427.7 acres of temporary impacts.

Where feasible, the pipeline was collocated with existing easements and rights-of-way (e.g., roads and utility lines). About 44.3 miles (26.8 miles in Pennsylvania and 17.5 miles in New Jersey), or about 37 percent, of the 115.1-mile-long pipeline route would be constructed adjacent to existing rights-of-way.

2.2.2 Aboveground Facilities

The Project would use about 31.1 acres of workspace for construction activities associated with the aboveground facilities, of which about 26.5 acres would be permanently maintained for operations (see table 2.2-1). For the Kidder Compressor Station, PennEast would use about 34.7

acres during construction of which 34.0 acres would be maintained for operation. Construction of the compressor station would occur within a 60-acre forested tract that PennEast would purchase.

2.2.3 Access Roads

To the extent feasible, PennEast would use existing roads as a means of accessing the Project. PennEast would access the pipeline construction right-of-way and aboveground facilities via 116 access roads. Of the 116 access roads 100 are existing or partially existing roads, 55 of which would require improvements. The existing or partially existing access roads consist of gravel roads, dirt roads, and paved roads. Following construction, 11 access roads would be maintained for operation of the Project, three of which would be newly constructed roads.

2.2.4 Pipe and Contractor Ware Yards

To support construction, PennEast plans to use 14 pipe and contractor ware yards consisting of 372.3 acres on a temporary basis. These pipe and contractor ware yards would be used by the contractor and/or PennEast to stage personnel, equipment, new pipe, and other materials necessary for the construction of Project facilities, and could include contractor trailers, construction equipment, fuel/lubricants, and vehicle parking. Upon completion of construction, pipe and contractor ware yards would be restored and allowed to revert to previous land uses.

2.3 CONSTRUCTION PROCEDURES

The Project would be designed, constructed, operated, and maintained to conform to, or exceed, the minimum federal safety standard requirements of PHMSA in 49 CFR Part 192,[10] and other applicable federal and state regulations, including U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) requirements. These regulations are intended to ensure adequate protection for the public. Among other design standards, Part 192 specifies pipeline material and qualification, minimum design requirements, and protection from internal, external, and atmospheric corrosion.

To reduce construction impacts, PennEast would implement their Project-specific Erosion and Sediment Control Plan (E&SCP). A copy of PennEast's E&SCP is contained in appendix D. The E&SCP is based on the mitigation measures contained in our Upland Erosion Control, Revegetation, and Maintenance Plan (Plan) and Wetland and Waterbody Construction and Mitigation Procedures (Procedures).[2] We reviewed PennEast's E&SCP, found it to be acceptable, and have determined that PennEast's adherence to its E&SCP would reduce impacts of the Project.

To avoid or minimize the potential for harmful spills and leaks during construction, PennEast developed an acceptable Spill Prevention, Control and Countermeasures (SPCC) Plan.

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[10] Pipe design regulations for steel pipe are contained in subpart C, Part 192. Section 192.105 contains a design formula for the pipeline's design pressure. Sections 192.107 through 192.115 contain the components of the design formula, including yield strength, wall thickness, design factor, longitudinal joint factor, and temperature derating factor, which are adjusted according to the project design conditions, such as pipe manufacturing specifications, steel specifications, class location, and operating conditions. Pipeline operating regulations are contained in subpart L, Part 192.

[2] Our Plan and Procedures are a set of construction and mitigation measures that were developed in collaboration with other federal and state agencies and the natural gas pipeline industry to minimize the potential environmental impacts of the construction of pipeline projects in general. The Plan and Procedures can be viewed on the FERC Internet website at http://www.ferc.gov/industries/gas/enviro/guidelines.asp.

The SPCC Plan describes spill and leak preparedness and prevention practices, procedures for emergency preparedness and incident response, and training requirements.

Other resource-specific plans that have been developed for the proposed Project are discussed in more detail in section 4.0.

2.3.1 Pipeline Facilities

PennEast would employ conventional cross-country pipeline construction techniques in accordance with its E&SCP. Work would be conducted as shown in figure 1.7-1 as one continuous operation to minimize the amount of time a tract of land is disturbed. The stages of typical pipeline construction procedures are shown in figure 2.3-1 and described in sections 2.3.1.1 and 2.3.1.2 below. In areas where timing restrictions are required, pipeline construction may differ slightly than as described below to meet those restrictions.

2.3.1.1 General Pipeline Construction Procedures

Standard pipeline construction consists of specific activities that make up a linear construction sequence. Typical construction activities include the following:

- surveying and staking;
- clearing and grading;
- trenching;
- pipe stringing, bending, welding, and coating;
- lowering in and backfilling;
- hydrostatic testing; and
- cleanup and restoration.

Survey and Staking

PennEast would contact the Pennsylvania and New Jersey One Call Systems to verify and mark all utilities where any ground disturbance would occur. Prior to construction, PennEast would survey and stake the route centerlines, foreign pipeline and utility crossings, and workspace limits, along with wetland boundaries and other environmentally sensitive areas. Typically, PennEast would stake the centerline in 200-foot intervals and at points of inflection (pipeline bends or PIs).

Clearing and Grading

Clearing and grading crews would remove vegetation and obstacles from the construction right-of-way and temporary workspaces required for construction. This would include trees (as necessary), stumps, logs, brush, and large rocks. Unless necessary for construction purposes, timber would be limbed, cut, and removed from the workspace. Stumps and brush would be chipped and spread in uplands areas (chips would not be left in agricultural areas or within 50 feet of wetlands) or removed from the right-of-way, burned, hauled to offsite commercial facilities or an approved location in accordance with applicable regulations, stored along the right-of-way with landowner approval, or other approved methods. Burning would be conducted in accordance with local notification, ordinances, and requirements. Fences within the construction workspace would be cut and braced where necessary. Temporary fences would be installed to control livestock, protect sensitive areas, and limit access by the public as necessary.

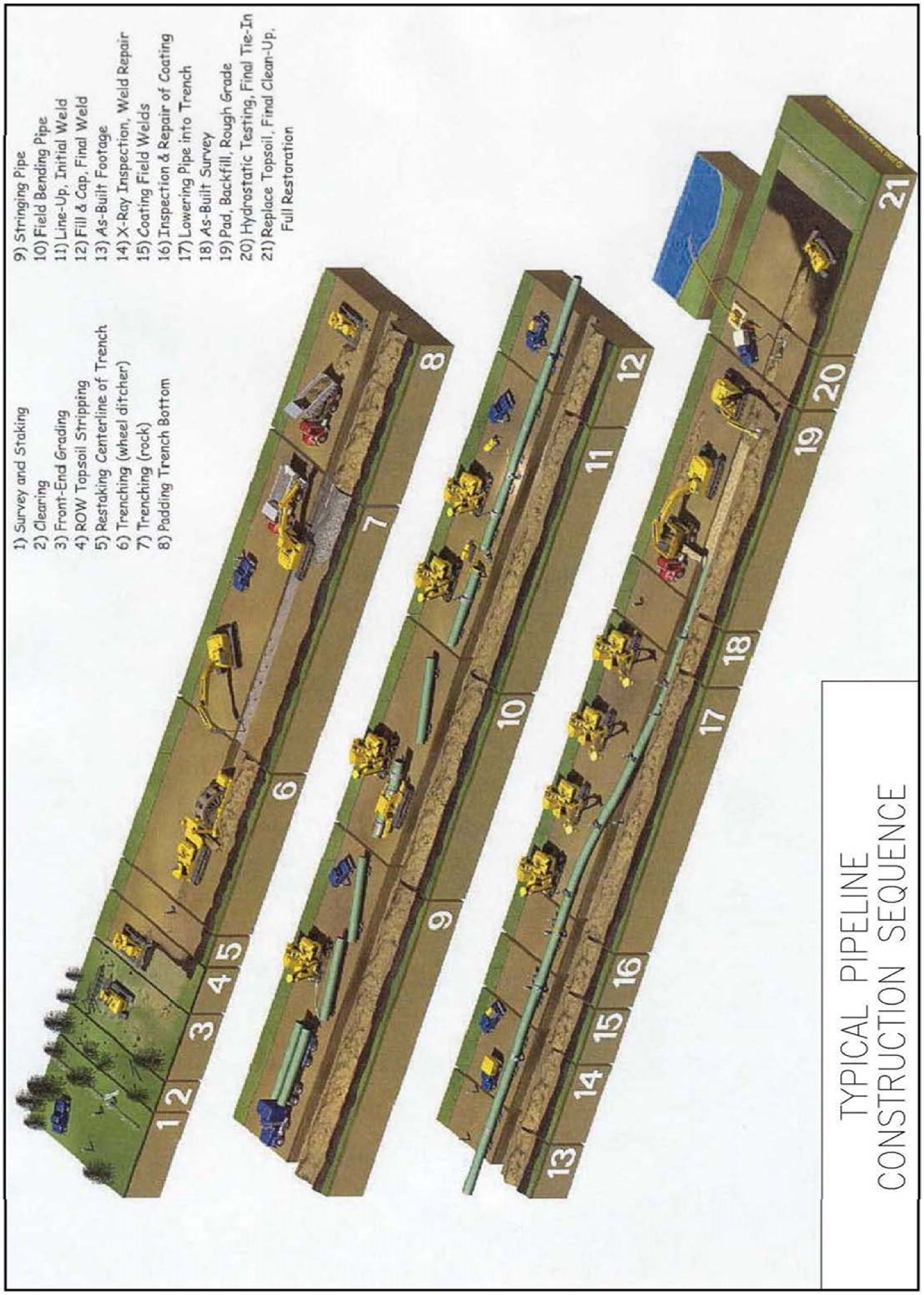

Figure 2.3-1 Typical Pipeline Construction Sequence

Prior to grading, PennEast would install erosion control devices. The upland portions of the construction right-of-way would be graded to create a safe and level work surface. PennEast would preserve the natural drainage to the extent practicable.

Trenching

Trenching would be conducted by a rotary wheel ditching machine, backhoe, or ripper. Typically, the trench would be excavated to a depth sufficient to provide 3 feet of soil cover over the top of the pipe after backfilling. In areas of bedrock, a minimum of 18 inches of cover would be provided in Class I Areas and 24 inches in Class II and III Areas, in accordance with DOT requirements (discussed in more detail in section 2.6). PennEast would provide a minimum 4 feet of cover in active agricultural areas. Additional cover would also be provided at road, railroad, and waterbody crossings. At least 12 inches of clearance would be maintained when crossing foreign utility lines.

Excavated soil would be stockpiled along the right-of-way away from construction traffic and the pipe assembly area (the "spoil side"). In areas of actively cultivated crops and pastures, residential areas, wetlands, and other areas at the landowner's request, PennEast would segregate and store separately the topsoil from subsoils. In these areas, PennEast would remove and segregate up to 12 inches of topsoil.

Pipe Stringing, Bending, Welding, and Coating

Pipe would be delivered to the cleared and graded right-of-way where it would be strung adjacent to the trench. Bends in the pipe may be needed for direction changes, as well as natural grade changes. Prior to welding, select joints would be bent in the field by track-mounted hydraulic bending machines. Following stringing and bending, the pipe would be placed on supports to weld segments of pipe together. The pipe would arrive on the Project site with a protective coating with the ends uncoated where they would be welded together. Once welded, these areas are coated by a coating crew. The pipe would then be inspected for defects in the coating and welds and repaired as needed before installation in the trench.

Lowering In and Backfilling

The trench would be dewatered, if needed, to perform an inspection of the trench and cleaned of debris. In rocky areas, sandbags or support pillows may be placed on the bottom of the trench to protect the pipe.

PennEast would lower the pipe into the trench and install trench breakers as required before backfilling at specified intervals to prevent water movement along the pipeline. In areas of saturated soil, set-on concrete weights, pipe sacks, soil anchors, and/or concrete coating may be used to keep the pipe from rising. After the pipe is in position, the trench would be backfilled with the previously excavated material. Clean fill or protective coating would be placed around the pipe prior to backfilling if the excavated material contains large rocks or other material that could damage the pipe or its coating. Where topsoil is required to be stored separately from subsoil, the subsoil would be backfilled first, followed by replacement of the topsoil. Topsoil would not be used to pad the pipe. In upland areas, a soil mound would be left over the trench to allow for soil settlement, unless otherwise requested by the landowner.

Hydrostatic Testing

Prior to hydrostatic testing, the pipe would be cleaned using a cleaning pig. After backfilling, the pipeline would be hydrostatically tested in accordance with the requirements in 49 CFR 192, PennEast's E&SCP, and any requirements of individual state permits. PennEast would use water from municipal supplies for the hydrostatic testing. No chemicals would be added to the test water. The water in the pipe segments would be pressurized and held for a minimum of eight hours (or four hours for prefabricated units and for short, visible sections). If leaks are found, the defect would be repaired and the pipe section would be re-tested until all required specifications are met. Upon completion of hydrostatic testing, the water would be discharged in accordance with all applicable federal and state water requirements. Refer to section 4.3.2.5 of this EIS for additional information on hydrostatic testing, including proposed sources for hydrostatic test water withdrawal and discharge.

Cleanup and Restoration

All work areas would be graded to match pre-construction contours. Erosion control methods would be implemented and could include contouring, permanent slope breakers, mulch, and re-seeding or sodding with soil-holding grasses. PennEast would restore fences, gates, driveways, and roadways affected by construction to original or better condition. Upland locations, excluding actively cultivated cropland, would be revegetated with seed, fertilizer, and soil additive recommendations based on landowner, FWS, and/or the local soil conservation authority requirements/recommendations.

Markers showing the location of the pipeline would be installed in accordance with 49 CFR 192. The markers would identify PennEast as the operator and list telephone numbers for emergencies and inquiries. PennEast would place markers at regular intervals along the rights-of-way and adjacent to road crossings.

2.3.1.2 Special Construction Procedures

Waterbody Crossings

A total of 255 waterbodies would be crossed during construction of the Project, 165 waterbodies in Pennsylvania and 90 waterbodies in New Jersey. PennEast would follow timing restrictions set by the USACE, Pennsylvania Fish and Boat Commission (PFBC), and NJDEP for crossings of sensitive streams as well as timing restrictions set forth by the Susquehanna and Delaware River Basin Commissions. Evaluation of crossing methods was done in consultation with the FWS, PADEP, NJDEP, and USACE. The crossings would all be completed in a dry environment, which greatly reduces the environmental impact of the crossing.

During ditching activities, PennEast would drill and blast streams that contain solid bedrock. PennEast would submit the required permit with the PFBC, as well as a blasting plan with the NJDEP should blasting be required in streams. All blasting would be conducted in accordance with PennEast's E&SCP.

Conventional Open-cut Crossing

Conventional open-cut, conventional bore, or horizontal directional drill (HDD) methods would all be used to cross waterbodies. The open-cut crossing method would involve excavation of the pipeline trench across the waterbody with a backhoe-type excavator. The excavators would operate from one or both banks of the waterbody. Spoil excavated from the trench would be placed above the ordinary high water mark for use as backfill, with the top 12 inches being segregated for use as the top layer of backfill. The pipe segment would be weighted, as necessary, to provide negative buoyancy. Once the pipe is installed and the trench backfilled, the banks and stream bottom would be restored to pre-construction contours and stabilized.

Dry Crossing Methods

Dry crossing methods (flume or dam-and-pump) would be used at specific waterbodies with perceptible flow. A dry ditch crossing diverts water flow during pipe installation.

Flume Crossing

A flume crossing directs the flow of water through one or more flume pipes placed over the area to be excavated. After the flume pipes are placed in the stream, sand or pea gravel bags would be placed upstream and downstream of the crossing location. The bags would serve to temporarily dam the stream and divert stream flow through the flume pipes. Trenching then occurs with backhoes located on both banks that excavate under the flume pipes without reducing downstream water flow. Concrete coating or set-on weights would be utilized, as necessary, to keep the pipeline from floating to the surface. After pipe installation, backfill of the trench, and restoration of the stream banks, the flume pipes would be removed.

Dam-and-Pump Crossing

The dam-and-pump method involves installing temporary dams upstream and downstream of the waterbody with sand or pea gravel bags. Following dam installation, PennEast would use appropriately sized pumps with hoses to transport the stream flow around the construction work area and trench. The area between the dams would be dewatered prior to trenching. Energy dissipating devices, such as steel plates, would be installed at the pump discharge point to minimize erosion and streambed scour. Trench excavation and pipe installation would then commence through the dewatered portion of the waterbody. After pipeline installation, backfill of the trench, and restoration of the stream banks, the temporary dams would be removed, and flow across the construction work area would be restored.

Horizontal Directional Drill

PennEast proposes to utilize the HDD method at 11 locations along the pipeline route. The locations where PennEast proposes to utilize the HDD method are presented in table 2.3.1-1.

HDD installation involves a pipe segment installed beneath the ground surface by pulling the pipe through a borehole. At a HDD crossing, a drill rig would be placed on the entry side of the HDD and a small pilot hole would be drilled along a pre-determined path beneath the crossing. The pilot hole would be progressively enlarged through a process called reaming. Several passes with progressively larger reaming tools would be needed to enlarge the hole to a sufficient diameter to accommodate the pipeline. During this process, bentonite drilling fluid would be circulated through the hole to remove drill cuttings and maintain the integrity of the hole. Once the reaming process is complete, a prefabricated segment of pipe would be attached to the drill string on the exit side of the crossing, and pulled back through the hole toward the drill rig.

TABLE 2.3.1-1 HDD Locations for the PennEast Pipeline			
Location/Feature	**Begin MP**	**End MP**	**Approximate Length (feet)**
U.S. Highway 81/State Highway 315	10.4	10.7	1,550
Wild Creek/Pohopoco Stream (Beltzville Lake)	43.2	44.4	6,100
St. Lukes (Lowes)	69.9	70.5	2,875
Lehigh RIver	70.6	71.4	4,100
Interstate 78	71.6	72.1	2,375
Delaware River and Canal	77.4	77.9	2,835
Lockatong Creek	91.4	92.6	6,300
Alexauken Creek	99.7	100.9	5,875
Pleasant Valley Road	105.4	106.0	3,100
Washington Crossing Pennington Road	110.4	110.9	2,575
CSXT Railroad	111.4	111.9	2,550

For each waterbody or wetland that would be crossed using the HDD method, PennEast would prepare site-specific plans that would include:

- site-specific construction diagrams that show the location of mud pits, pipe assembly areas, and all areas to be disturbed or cleared for construction;
- justification that disturbed areas are limited to the minimum needed to construct the crossing;
- identification of any aboveground disturbance or clearing between the HDD entry and exit workspaces during construction;
- description of how an inadvertent release of drilling mud would be contained and cleaned up; and
- a contingency plan for crossing the waterbody or wetland in the event the HDD is unsuccessful and how the abandoned drill hole would be sealed, if necessary.

While the HDD method is a proven technology, there are certain impacts that could occur as a result of the drilling such as the inadvertent release of drilling mud, which is a non-hazardous fluid comprised primarily of water, inert solids, and bentonite, a naturally occurring clay mineral. Drilling fluids that are released typically contain a lower concentration of bentonite when they surface because the bentonite is filtered out as it passes through sandy soils.

The conventional bore method is similar to HDD in that the pipeline is installed beneath a feature without surface disturbance to the feature during crossing. The bore method differs in that the path of the pipeline across the feature is straight rather than curved. Bores are frequently used at paved road and railroad crossings and are not a common crossing method for waterbodies primarily because of the difficulty in managing groundwater during the installation. Boring requires excavation of pits on each side of the feature. During a standard boring operation, spoil from the bore would be carried into the pit as the crossing is being completed and then removed by track hoes to provide room for the pipe to be welded and eventually pulled through the borehole. The operator for the boring machine, welders, and several laborers would work in the bore pit.

Trench boxes or sheet piling may be used to support the pit walls and help control groundwater inflows.

Wetlands

Construction of the Project would result in 210 wetland crossings consisting of 38.8 acres, including 106 crossings in Pennsylvania and 104 crossings in New Jersey. Wetland crossings would be done in accordance with our Procedures as well as applicable Best Management Practices (BMPs) required by PADEP, NJDEP, and County Conservation Districts, as well as adherence to the Project SPCC Plan and E&SCP. Wetlands would be crossed utilizing a reduced 75-foot construction right-of-way and PennEast would maintain a 10-foot corridor centered on the pipeline during operation.

PennEast would clearly mark wetland boundaries in the field with signs and/or highly visible flagging prior to the start of construction. Vegetation would be cut off just above ground level. Tree stump removal and grading would be limited to the area directly over the trench unless safety-related construction constraints require otherwise. BMPs would be installed at the entry and exit points, if necessary, to maintain wetland hydrology and to minimize the flow of water to and from the trench. In unsaturated areas, topsoil over the trenchline would be segregated from the subsoil. Specific wetland crossing procedures would depend on the level of soil stability and saturation encountered during construction. Original topographic conditions and contours would be restored as nearly as practicable following construction.

Road Crossings

PennEast would cross roads utilizing either the open-cut, conventional bore, or HDD method. Open-cut crossing could involve closing the road to all traffic and constructing an adequate detour around the crossing area or excavating one side of the road while traffic is maintained on the other half of the road.

The conventional bore and HDD methods would be similar as described above for waterbody crossings. Utilization of these methods would not disrupt traffic flow while construction across the road is completed.

Agricultural Areas

PennEast has developed an acceptable Agricultural Impact Minimization Plan that outlines protective measures that PennEast would implement to minimize impacts in agricultural areas (see appendix E). Prior to construction, PennEast would provide landowners and tenant farmers of active agricultural lands with advanced notice of construction activities. The advanced notice would not be less than 24 hours. Prior to construction, drain tiles would be located with landowner coordination and checked for damage. Any damage to these systems as a result of construction would be repaired by PennEast following construction by a qualified drain tile specialist. PennEast would segregate topsoil, which would be windrowed parallel to the pipeline in a manner to prevent mixing with the subsoil. PennEast would construct the pipeline with a minimum of 4 feet of cover in agricultural lands.

Residential and Other Areas

Where residences or business establishments are within 50 feet of construction, PennEast would install safety fences along the edge of the right-of-way for a distance of 100 feet to each side of the residence or business establishment. PennEast would utilize special construction techniques such as stove pipe or drag section (see below) in areas of congestion where a minimum distance of 25 feet cannot be maintained between the residence or business establishment and the edge of the construction work area. PennEast would not remove mature trees and landscaping from within the construction right-of-way unless necessary for the safe operation of construction equipment. Lawn and landscaping would be restored immediately following backfilling, weather conditions permitting and in accordance with any agreements between landowners and PennEast.

Stove Pipe Construction

In areas where right-of-way width would be reduced because of constraints adjacent to the right-of-way, PennEast would implement stove pipe construction. This requires the contractor to construct one length of pipe (usually 40 feet) at a time. A bell hole would be excavated at the end of the single joint to allow construction personnel to safely attach the newly installed pipe to the pipe already in the ditch. Standard upland construction methods would be followed at this point. The construction crew required for the stove pipe method would be smaller than the size used for typical upland construction and the amount of equipment on site would be limited to that equipment necessary at that time. At the end of each day, the pipe would be lowered in and backfilled and/or covered with steel plates or timber mats. The length of excavation each day would not exceed the length of pipe installed.

Drag Section Construction

Drag section construction is used in areas where there is insufficient space to assemble the pipe in-place. With this technique, the trench is excavated, the prefabricated section of pipe (drag section) is installed, and the trench is backfilled all in one day. The drag section is assembled in staging areas away from the congested area. This method reduces the amount of time work occurs in a given location by conducting much of the construction sequence (bending, welding, x-ray, and coating) at the nearby staging area.

Blasting and Rock Removal

Rock removal would be accomplished through conventional backhoe excavation, ripping with a bulldozer, pneumatic hammering, or blasting. The technique utilized would be dependent on the hardness of the bedrock, fracture susceptibility, volume, and location. PennEast would perform all blasting according to federal and state safety standards and in accordance with their Blasting Plan to be implemented by the blasting contractor. Excess rock would be hauled off-site to an approved quarry for disposal.

Rugged Topography

Rugged topography, such as steep, vertical slopes and steep side slopes (i.e., slopes running parallel to the proposed route), is present in numerous areas along the proposed pipeline route. PennEast may employ a technique called "winching" that involves placing heavy equipment at the top of the slope to serve as an anchor point, and then connecting one or more additional pieces of equipment together with a cable. This provides stability and safety to the equipment operators as work proceeds up and down the steep slope.

Another construction method used in areas with steep side slopes is called the “two-tone” cut and fill method. Typically, the up-slope side of the construction right-of-way is cut during grading, and the soil excavated from the cut is then be used to fill the down-slope edge of the construction right-of-way to provide a safe and level working surface for heavy equipment. Pipeline construction then occurs on the level surface as it would in typical construction. Then, during restoration, the spoil material is placed back into the cut and compacted to match the original topography and contours. PennEast would require extra workspace in these areas for storage of excavated material from the temporary cut and fill areas, as well as for temporary storage of material such as trench spoil, excess rock, and felled timber.

Permanent trench breakers would be installed in the trench surrounding the pipeline in areas of steep slopes with high erosion potential and to prevent the high velocity channeling of water along the trench line. Methods such as sediment barriers, waterbars, or mulching and crimping may be used as necessary to control erosion until vegetation can be reestablished.

2.3.2 Aboveground Facilities Construction Procedures

Aboveground facility construction would begin with clearing and grading, as necessary, to create level surfaces for the movement of construction vehicles and to prepare areas for equipment removal and new equipment installations. Erosion and sediment controls would be installed. Aboveground facilities would be constructed in accordance with American Society of Mechanical Engineers (ASME) B31.8 standards.[3]

2.4 CONSTRUCTION SCHEDULE AND WORKFORCE

PennEast would construct the pipeline in four pipeline spreads. PennEast’s requested schedule includes receipt of all approvals in time for construction to begin in 2017. According to this schedule, PennEast would start winter tree clearing activities prior to the beginning of construction. Installation of HDD segments and contractor yard preparation would begin about the same time as tree clearing activities. Construction of the mainline would begin in the spring of 2017. Construction of the Project would take approximately six to nine months to complete and the Project placed in service by late November 2017. Construction of the Project would require a workforce of about 665 people involved in each spread.

2.5 ENVIRONMENTAL COMPLIANCE INSPECTION AND MITIGATION MONITORING

PennEast would comply with all conditions set forth in their permits as well as adhere to our Plan and Procedures. Environmental training would be required for all land agents, construction personnel, and environmental inspectors that details timing, notification, and

[3] ASME B31.8 prescribes requirements for the design, fabrication, installation, testing, and safety aspects of operation and maintenance of gas transmission and distribution piping systems, including gas pipelines, gas compressor stations, gas metering and regulation stations, gas mains, and service lines up to the outlet of the customer’s meter set assembly.

environmental permit conditions required to be implemented at each phase of construction, restoration, and mitigation.

During construction and restoration, a Chief Environmental Inspector, as well as two Environmental Inspectors (EIs), would be assigned to each of the four spreads. The EI would have the authority to stop work activities if environmental conditions set forth in PennEast's permits, including the FERC Order, are being violated. The EI would then order corrective action. The specific responsibilities for the EI are described in PennEast's E&SCP.

In addition, FERC staff would conduct periodic inspections to monitor the Project for compliance with the Commission's environmental conditions and Project mitigation measures proposed by PennEast. PennEast has also committed to utilizing the FERC's third-party monitoring program. The third-party monitors would represent FERC and would be on-site daily during Project construction and restoration. The USACE would also conduct compliance inspections of the water and wetland crossings during construction and post construction.

2.6 OPERATION, MAINTENANCE AND SAFETY CONTROLS

PennEast would own, operate, and maintain the Project facilities in accordance with 49 CFR Part 192 and 199, as well as all other applicable regulations. Maintenance would include regularly scheduled ground and overflight surveys. These patrols would provide information on potential leaks, construction activities, erosion, population density, possible encroachment, and other potential problems that would interfere with the safe operation of the pipeline. PennEast would also perform periodic internal inspections of the pipeline through use of pigs, as well as periodic inspections of MLVs, water crossings, and erosion control devices.

PennEast would install and maintain a cathodic protection system to mitigate for potential pipeline corrosion. In areas of high-voltage electric transmission lines, PennEast would install an alternating current mitigation system to reduce stray current and prevent possible shock to personnel during operation. The system would also serve to prevent interference with the cathodic protection system.

PennEast would adhere to their E&SCP during vegetation maintenance of the operational right-of-way. PennEast would conduct routine vegetation mowing or clearing over a 30-foot-wide corridor centered on the pipeline, except in wetlands where a 10-foot corridor would be maintained as needed over the center of the pipeline to facilitate corrosion and leak surveys. The mowing or clearing would be conducted no more frequently than once every three years. Trees and shrubs located within 15 feet of the pipeline that could compromise the integrity of the pipeline would be cut and removed. No herbicides or pesticides would be used for clearing or maintenance within 100 feet of a waterbody.

3.0 ALTERNATIVES

As required by CEQ regulations for complying with the NEPA (at 40 CFR Part 1502.14), and FERC policy, we evaluated alternatives to the Project to determine whether an alternative would be environmentally preferable and/or technically and economically feasible to the proposed action. This EIS compares the environmental impacts of the proposed action against a range of alternatives. Each of the cooperating agencies with obligations under NEPA can use this alternatives analysis as part of their decision making process. Individual agencies would ensure consistency with their own administrative procedures prior to accepting the recommendations in this EIS.

Alternatives considered, which are described in more detail below, include the No Action alternative, system alternatives, pipeline route alternatives, pipeline route variations, and aboveground facilities alternatives. Alternatives were evaluated against the purpose and objectives of the Project, as described in section 1.1. PennEast's primary objective is to provide approximately 1.1 MMDth/d of year-round natural gas transportation service from northern Pennsylvania to markets in New Jersey, eastern and southeastern Pennsylvania, and surrounding states, through an interconnect with the Transcontinental Gas Pipe Line (Transco) pipeline in Hopewell Township, Mercer County, New Jersey. Shippers (customers) who have contracted with PennEast for natural gas volumes are shown in table 3.1-1. The agreements with the Project shippers account for about 90 percent of the Project design capacity of 1.1 MMDth/d.

TABLE 3.1-1

PennEast Customers and Transportation Capacity Subscribed to the Project

Shipper	Transportation Contract Quantity (Dth/Day)
New Jersey Natural Gas Company	180,000
PSEG Power LLC	125,000
Texas Eastern Transmission	125,000
South Jersey Gas Company	105,000
Consolidated Edison Company	100,000
Pivotal Utility Holdings, Inc. (d/b/a Elizabethtown Gas)	100,000
UGI Energy Services, LLC	100,000
Cabot Oil & Gas Corporation	50,000
Talen Energy Marketing, LLC	50,000
Enerplus Resources (USA) Corporation	30,000
Warren Resources, Inc.	15,000
NRG REMA LLC	10,000
Total	**990,000**

PennEast states that the Project was developed in response to market demands and interest from shippers that require transportation capacity to accommodate increased demand and greater reliability of natural gas in the region.

The FERC's evaluation criteria for selecting alternatives include whether they:

- are technically and economically feasible, reasonable, and practical;
- offer a significant environmental advantage over the proposed action; and
- have the ability to meet the objectives of the project.

With respect to the first criterion, it is important to recognize that not all conceivable alternatives are technically and economically feasible and practical. Some alternatives may be impracticable because they are unavailable and/or incapable of being implemented after taking into consideration costs, existing technologies, and the overall Project purpose. We do not design natural gas pipeline projects. Rather, companies propose and design projects in response to market conditions. In turn, we analyze these proposals and identify and disclose a reasonable range of alternatives. In conducting this analysis, it is important to recognize the environmental advantages and disadvantages of the proposed actions in order to focus the analysis on reasonable alternatives that may reduce impacts and offer a significant environmental advantage. A detailed discussion of the environmental consequences of the Project (both adverse and beneficial) is included in section 4 of this EIS.

An important consideration in assessing pipeline route alternatives is that the pipeline must be constructible to be feasible. In most cases we used desktop data for comparisons, including USGS topographic quadrangle maps, aerial photography, National Wetlands Inventory (NWI) maps, site file searches, and literature reviews. However, in some cases, where a previously proposed route is now an alternative, PennEast may have conducted on-the-ground environmental surveys of the alternative. While the raw data were collected by PennEast, FERC staff and cooperating agencies performed the alternatives analyses, which included validation of data supplied by PennEast and field reconnaissance from the air and public access points.

The narrative below explains why a particular alternative was found to be environmentally preferable. In conducting a reasonable analysis, we considered environmental advantages and disadvantages, and focused the assessment on those alternatives that may minimize impacts on specific resources. In general, a smaller footprint or shorter pipeline is better. One mile of a 100-foot-wide construction corridor would impact about 12 acres. Other elements that may influence the selection of an alternative included the avoidance of historic properties or habitat for federally-listed threatened or endangered species, reduction of number of crossings of waterbodies or wetlands, avoidance of geological hazards, distances from residences, lessening of forest clearing, or impacts on agricultural land and specialty crops. In some cases, there were tradeoffs between impacts identified during the alternatives analysis, as minimization of impacts on one type of resource had to be compared to increased impacts on a different set of resources.

We considered a range of alternatives in light of the Project's objectives, feasibility, and environmental consequences. Each alternative was considered until it became clear that the alternative would not satisfy one or more of the evaluation criteria, or that the alternative would in fact be environmentally preferable.

3.1 NO ACTION ALTERNATIVE

The Commission has two courses of action in processing applications under section 7 of the NGA: 1) deny the requested action (the No Action Alternative), or 2) grant a Certificate, with or without conditions. Under the No Action Alternative, the short- and long-term environmental impacts described in this EIS would not occur, but the objectives of the Project would not be met. The Project would create an additional approximately 1.1 MMDth/d of year-round transportation service from northern Pennsylvania to markets in southeastern Pennsylvania and New Jersey eastern and surrounding states.

According to PennEast, the Project is designed to provide a long-term solution to bring the lowest cost natural gas available in the country produced in the Marcellus Shale region in northern Pennsylvania to homes and businesses in Pennsylvania, New Jersey, and surrounding states. The Project was developed in response to market demands and interest from shippers that require transportation capacity to accommodate increased demand and greater reliability of natural gas in the region. See table 3.1-1 above. The Project would provide a new interstate transmission pipeline to serve markets in the region with firm, reliable access to the Marcellus Shale supplies versus the traditional, more costly Gulf Coast regional supplies and pipeline pathways. An additional supply of natural gas to the region would provide a benefit to consumers, utilities, and electric generators by providing enhanced competition among suppliers and pipeline transportation providers.

If PennEast's proposed facilities are not constructed, the Project shippers may need to obtain an equivalent supply of natural gas from new or existing pipeline systems. In response, PennEast or another natural gas transmission company would likely develop a new project or projects to provide the volume of natural gas contracted through the Project's binding precedent agreements with the Project shippers. Alternatively, customers of the Project shippers could seek to use alternative fuel or renewable energy sources, which could require new facilities. In either case, construction of new pipelines or other energy infrastructure would result in environmental impacts that could be equal to or greater than those of the Project. For these reasons, the No Action Alternative would not be preferable to or provide a significant environmental advantage over the Project.

The Commission received numerous comments suggesting that electricity generated from renewable energy sources could eliminate the need for the Project and that the use of these energy sources as well as gains realized from increased energy efficiency and conservation should be considered as alternatives to the Project. The generation of electricity from renewable energy sources is a reasonable alternative for a review of power generating facilities. The siting, construction, and operation of power generating facilities are regulated by state agencies. Authorizations related to how customers in the service areas of the shippers who would receive gas from the PennEast Project will meet demands for electricity are not part of the application before the Commission and their consideration is outside the scope of this draft EIS. Therefore, because the purpose of the Project is to transport natural gas, and the generation of electricity from renewable energy sources or the gains realized from increased energy efficiency and conservation are not transportation alternatives, they are not considered or evaluated further in this analysis.

3.2 SYSTEM ALTERNATIVES

System alternatives would utilize existing, modified, or proposed natural gas pipeline systems to meet the objectives of the Project. Implementation of a system alternative would make it unnecessary to construct all or part of the Project, although modifications or additions to existing or proposed systems could be required. These modifications or additions would result in environmental impacts that could be less than, similar to, or greater than those associated with construction and operation of the Project. The purpose of identifying and evaluating system alternatives is to determine whether the environmental impacts associated with construction and operation of the Project could be avoided or reduced by using another pipeline system, while still meeting the objectives of the proposed action.

A viable system alternative to the Project would have to provide the pipeline capacity necessary to transport an additional 1.1 MMDth/d of natural gas at the contracted volumes and to the delivery points required by the precedent agreements signed by PennEast and the Project Shippers. A viable system alternative would need to provide these services within a timeframe reasonably similar to the Project.

Our analysis of system alternatives includes an examination of existing and proposed natural gas transportation systems that currently or eventually would serve the markets targeted by the Project, and considers whether those systems would meet the Project's objectives while providing an environmental advantage over the proposed action. A brief assessment of each of the existing and proposed systems is provided in the subsections below.

3.2.1 Existing Systems

Existing natural gas transportation systems in the Project area are shown in figure 3.2-1. One existing system, the Transco system, generally has a north-south alignment that could be considered a potential system alternative to the PennEast Project.

3.2.1.1 Transco Leidy Line System Alternative

We considered an expansion of the existing Transco Leidy Line pipeline as a possible system alternative to the proposed Project. An expansion of Transco's Leidy Line could access the same production region that the Project accesses; however, the Transco Leidy Line does not offer the same access to specific delivery point locations provided by the Project. The existing Transco Leidy Line is shown on figure 3.2-1.

The simplest and least environmentally damaging expansion of the Transco Leidy Line would involve what is known as "pipeline looping," which would include installation of an additional pipeline adjacent to portions of the existing pipeline to increase overall system capacity. Additional compression would also likely be required either at existing compressor station(s) or at a new compressor station. Looping typically involves constructing a new pipeline parallel to and about 25 feet from an existing pipeline, and while looping can partially make use of existing right-of-way, it does not avoid the need for new right-of-way. Looping typically requires about 75 feet of construction right-of-way, and 25 feet of new permanent right-of-way, outside of an existing right-of-way. Therefore looping can present challenges for older pipelines where development has encroached up to the edges of existing pipeline rights-of-way.

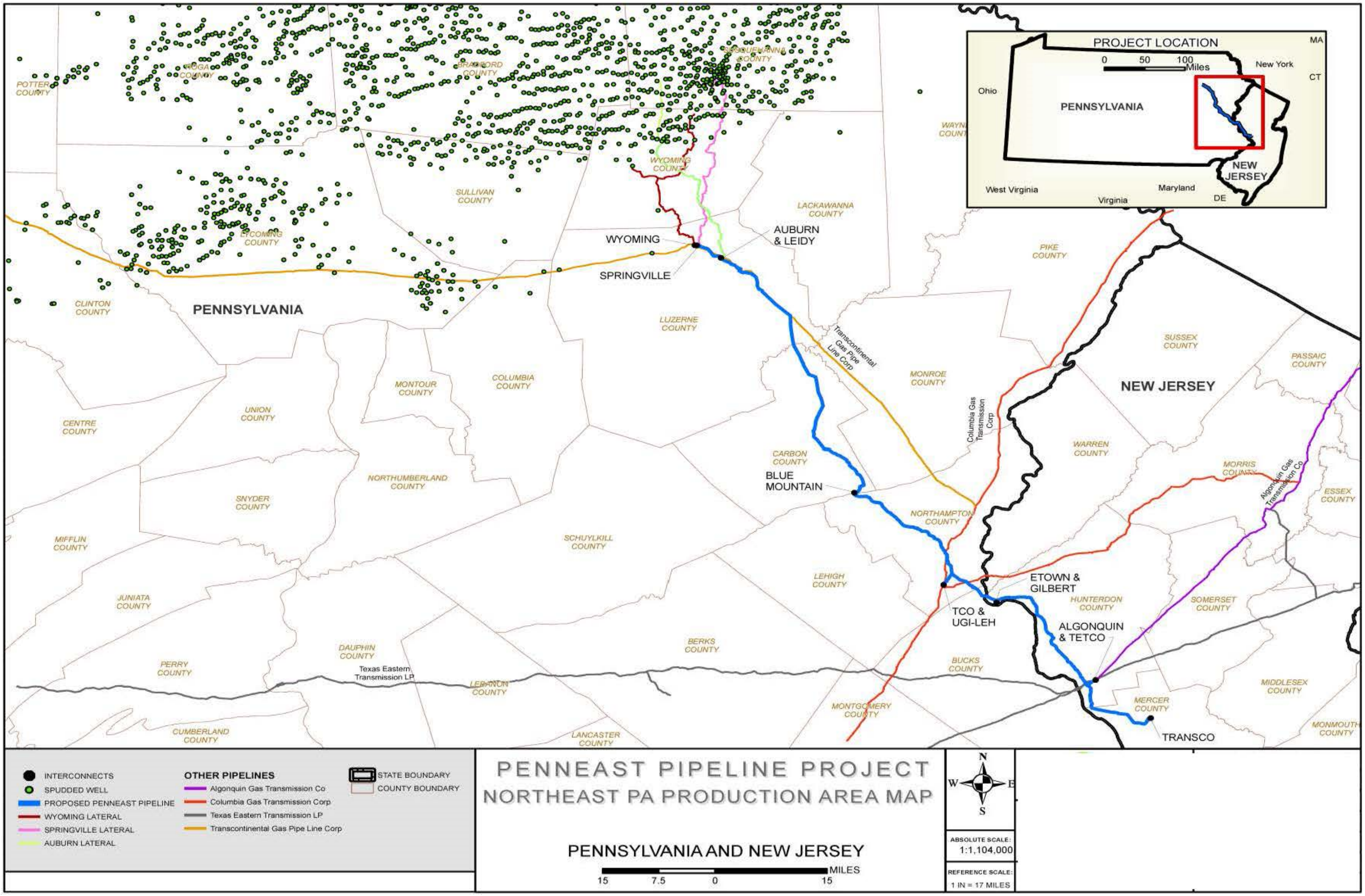

Figure 3.2-1 Existing Natural Gas Transmission Pipelines in the Project Area

Transco has evaluated its own expansion of the Leidy Line as part of its proposed Atlantic Sunrise Project, but has determined that the existing Transco pipeline system is extremely capacity constrained in New Jersey and Southern Pennsylvania, operating in very densely populated areas (Transco 2015). As part of our review of the Atlantic Sunrise Project (FERC 2016) we reviewed the potential looping segments along the Transco Leidy Line and agree that collocation would not be feasible in certain areas due to the amount of commercial, industrial, and residential development that has occurred adjacent to Transco's existing right-of-way. We were unable to identify alternative alignments to avoid these developed areas that would not significantly increase the length of the pipeline and the overall construction footprint.

Use of the Transco Leidy Line would also not provide access to the delivery points proposed by PennEast. The PennEast Project includes direct delivery to UGI Central Penn Gas, Inc. and UGI Utilities, Inc. in Pennsylvania, as well as the Gilbert Electric Generating Station and Elizabethtown Gas in New Jersey, which are deliveries that cannot be made by utilizing the Transco system without the addition of lateral pipelines to serve these delivery points. PennEast's proposed route also provides for an interconnection with both Algonquin Gas Transmission, LLC and Texas Eastern Transmission, LP (Texas Eastern) at one location. In addition, an expansion of the Transco Leidy Line pipeline system would not provide the Project purpose of adding a new pipeline in the region to deliver production from the nearby production region to the markets to be served by the Project.

For these reasons, an expansion of the existing Transco Leidy Line pipeline system was not evaluated further as a potential system alternative. We have also evaluated a pipeline route alternative for the PennEast Pipeline that would involve placing the proposed pipeline adjacent to the existing Transco Leidy Line (see section 3.3.1.2).

3.2.1.2 Columbia Gas System Alternative

Columbia Gas owns interstate pipeline facilities in portions of eastern Pennsylvania and New Jersey (figure 3.2-1). However, Columbia Gas lacks the capability to receive gas in the production region in which PennEast's receipt points would be located. In order to access the same production region that the Project would access and to deliver the production at all the same delivery points that PennEast proposes for the Project, the Columbia Gas system would need to be expanded with new pipeline facilities nearly identical to the facilities proposed by PennEast. Therefore, an expansion of the Columbia Gas pipeline system is not considered a reasonable alternative to the proposed PennEast Project.

3.2.1.3 Texas Eastern System Alternative

Texas Eastern also owns interstate pipeline facilities in portions of eastern Pennsylvania and New Jersey (figure 3.2-1). However, Texas Eastern lacks the capability to receive gas in the production region in which PennEast's receipt points would be located. In order to access the same production region that the Project would access and to deliver the production at all the same delivery points that PennEast proposes for the Project, the Texas Eastern system would need to be expanded with new pipeline facilities similar to those proposed by PennEast. Therefore, an expansion of the Texas Eastern pipeline system is not considered a reasonable alternative to the proposed PennEast Project.

3.2.2 Other Proposed Systems

3.2.2.1 Transco Atlantic Sunrise Project

On March 31, 2015, Transco filed an application with the Commission proposing an expansion of its existing system in the Northeast and Southeast, known as the Atlantic Sunrise Project (FERC Docket No. CP15-138-000). We have evaluated the Atlantic Sunrise Project in a draft EIS (FERC 2016). The purpose of the Atlantic Sunrise Project would be connecting producing regions in northeastern Pennsylvania to markets in the Mid-Atlantic and southeastern states. In concept, this expansion of the Transco pipeline system could serve as a potential alternative to the PennEast Pipeline. The expansion would add 1.7 MMDth/d of pipeline capacity to the Transco system. The project would include additional compression and looping of the Transco Leidy Line in Pennsylvania along with a new 183-mile-long pipeline segment, referred to as the Central Penn Line, which would connect the northeastern Marcellus Shale producing region to the Transco mainline near Station 195 in southeastern Pennsylvania. The Central Penn Line would be constructed west of the existing Leidy Line (about 20 miles west of the Leidy Line at its northern end and about 80 miles west at its southern end). Additional existing Transco facilities would also be modified to allow gas to flow bi-directionally.

In total, the Atlantic Sunrise Project would include approximately 183 miles of new pipeline, two pipeline loops totaling about 12 miles (Chapman Loop, Unity Loop), 2.5 miles of existing pipeline replacement, two new compressor stations in Pennsylvania, and other facility additions or modifications in five states (Pennsylvania, Maryland, Virginia, North Carolina, South Carolina).

The Atlantic Sunrise Project is designed to add more capacity (1.7 MMDth/d) to the Transco System than is proposed by PennEast (1.1 MMDth/d). However, approximately 100 percent of the natural gas transportation capacity for the Atlantic Sunrise Project has already been contracted. Similarly, approximately 90 percent of the confirmed natural gas transportation capacity for the PennEast Project has already been contracted. Therefore, there is customer demand for both projects. In addition, the Atlantic Sunrise Project would not provide for the same delivery points for customers that have been identified for the PennEast Project. Also, the Atlantic Sunrise Project would involve construction and operation of more facilities than the PennEast Project, including new pipeline and new compressor stations and pipeline looping, which would result in similar or greater environmental impacts than the PennEast Project.

For the reasons discussed above, the Atlantic Sunrise Project would not provide a significant environmental advantage over the PennEast Project.

3.3 ROUTE ALTERNATIVES AND VARIATIONS

We evaluated route alternatives and variations to determine whether their implementation would be preferable to the proposed corresponding action (the "proposed route"). The proposed route is the pipeline route filed by PennEast in its September 2015 application with FERC, as modified by supplemental filings thereafter (December 14, 2015 and February 22, 2016). The proposed route is illustrated on maps contained in appendix B of this EIS.

Route alternatives are generally longer than variations and can deviate from the proposed route by a significant distance. Route variations are generally shorter in length and deviate from the proposed route to a lesser degree than a route alternative. During the course of identifying and refining its proposed route, PennEast met with landowners, reviewed comments filed on the FERC docket, and received feedback from agencies and municipalities regarding the pipeline route. This resulted in PennEast considering a number of route alternatives and variations that it included in its application with FERC and supplemental filings. Route alternatives and variations were also identified during our independent review of the PennEast Project area, and we also requested information on alternatives in data requests on PennEast's draft filings and application. Alternatives are evaluated in section 3.3.1 and variations in section 3.3.2 below.

We received many comments regarding the use of existing rights-of-way for the Project. PennEast also evaluated numerous locations where the Project could be placed adjacent to existing rights-of-way. About 44.5 miles (27.0 miles in Pennsylvania and 17.5 miles in New Jersey), or about 39 percent of the 115.0 miles of proposed route, is adjacent to existing rights-of-way. This routing concept has advantages and disadvantages, but is also often the source of confusion. Some commenters suggest that the pipeline should be placed entirely within existing rights-of-way, and some commenters expressed concern that PennEast has been deceptive by stating the Project would "use" existing rights-of-way when they actually propose to place the pipeline adjacent to existing rights-of-way. Placing the proposed pipeline entirely within existing easements is generally not feasible, primarily because there is not enough space for the addition of the proposed pipeline and new required easement. The width of existing easements are limited to that needed to safely operate and maintain the existing utility and do not include extra width that would accommodate the PennEast pipeline. PennEast is requesting a new permanent easement width of 50 feet to operate and maintain the pipeline in accordance with DOT minimum safety standards, and where the Project is collocated with other existing rights-of-way this new 50-foot-wide easement would be adjacent to, but not within, the existing rights-of-way..

In this alternatives analysis we evaluate and compare the amount of collocation between various alternatives and variations and the corresponding segments of proposed route. In general, while collocation does not eliminate the need for new right-of-way and new land disturbance, collocation may allow some temporary construction work area to overlap the existing easement therefore reducing the area of vegetation clearing required. Collocation can also have negative impacts on some resources, for example when residential development has encroached near an existing utility, or where collocation results in affected landowners having multiple easements on their properties.

3.3.1 Route Alternatives

3.3.1.1 Luzerne and Carbon Counties Route Alternative (MPs 8.4–37.5)

The Luzerne and Carbon Counties Alternative is a segment of route that PennEast initially evaluated during Project siting. The alternative is a segment of the previously identified alternative 1 and alternative 2 pipeline routes and was also identified as a "prior alternative" compared to Route Deviation No. 6 in PennEast's alternatives analysis (Resource Report 10) included with its application to FERC. (PennEast incorporated Route Deviation No. 6 into the proposed route). We evaluate the alternative here as the Luzerne and Carbon County Alternative.

The Luzerne and Carbon County Alternative would begin just south of the crossing of the Susquehanna River at MP 8.4 of the proposed route where it would turn south and continue generally parallel to the proposed route for about 2.7 miles. After crossing Interstate (I)-81, the alternative would turn to the south, and would generally follow just to the east of I-476 for 13.7 miles before crossing I-476 and continuing south for another 10.8 miles before rejoining the proposed route at MP 37.5. The alternative is shown on figure 3.3.1-1.

The alternative would be about 1.7 miles shorter, resulting in about 27.0 acres less disturbance during construction, and 10.8 acres less operational right-of-way, than the corresponding segment of proposed route. The alternative would impact about 1.5 acres of wetlands during construction compared to 12.0 acres by the corresponding segment of proposed route. The alternative would be adjacent to existing right-of-way for about 0.2 mile, compared to 23.0 miles for the corresponding segment of proposed route. The alternative would also be within 50 feet of 10 residences and cross 28 waterbodies, compared to 7 residences and 21 waterbodies along the corresponding segment of proposed route. An environmental comparison of the Luzerne and Carbon County Alternative to the corresponding segment of proposed route is provided in table 3.3.1-1.

TABLE 3.3.1-1

Comparison of the Luzerne and Carbon County Alternative to the Proposed Route for the PennEast Pipeline Project

Environmental Factor	Luzerne and Carbon County Alternative	Proposed Route
Length (miles)	27.2	28.9
Length Adjacent to Existing Rights-of-way (miles)	0.2	23.0
Construction Area (acres) a/	411.6	438.6
Operation Area (acres) b/	164.6	175.4
Residences within 50 feet of construction work space (number)	10	7
Forested Land Affected by Construction (acres)	395.4	380.4
Forested Land Affected by Operation (acres)	158.2	152.1
Agricultural Land Affected by Construction (acres)	1.0	2.8
Agricultural Land Affected by Operation (acres)	0.4	1.1
Wetlands Affected by Construction (acres)	1.5	12.0
Wetlands Affected by Operation (acres)	0.6	4.8
Waterbody crossings (number)	28	21
Special Interest Land Use Crossed (number)	2	1
Special Interest Land Use Affected by Construction (acres)	51.4	52.4
Special Interest Land Use Affected by Operation (acres)	20.6	21.0

Notes:
a/ Based on typical 125-foot-wide construction right-of-way.
b/ Based on a 50-foot-wide operational right-of-way.

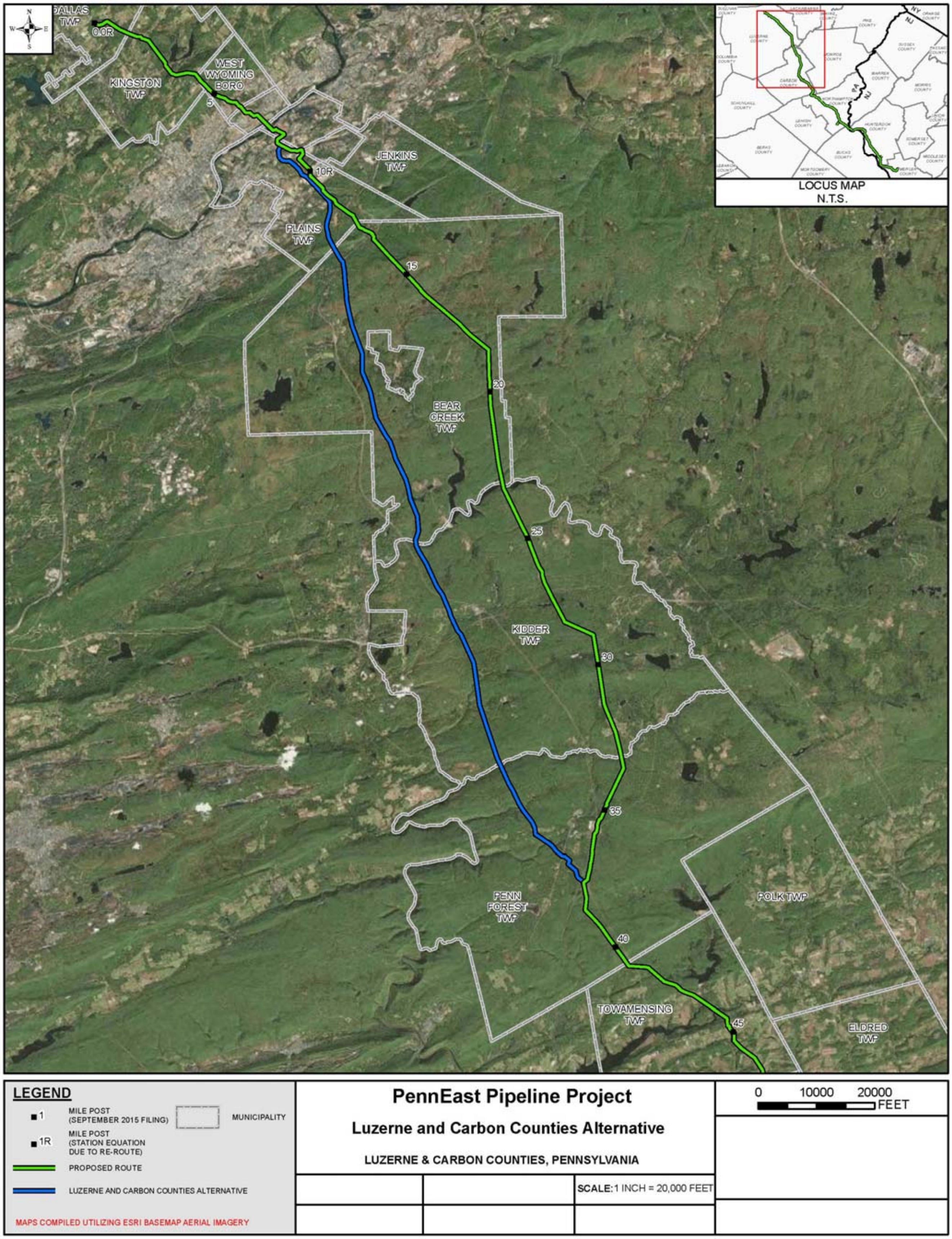

Figure 3.3.1-1 Luzerne and Carbon Counties Alternative

The primary advantage of the Luzerne and Carbon Counties Alternative is its shorter length and the reduced area of land disturbance that would result compared to the corresponding segment of proposed route. The alternative would also impact less wetland, less agricultural land, and slightly less special interest land use (State forest land) during construction and operation. The primary disadvantage of the alternative is it would be adjacent to (collocated with) existing right-of-way for only about 0.2 mile (< 1 percent), compared to 23 miles (80 percent) for the corresponding segment of proposed route. While collocation with another existing right-of-way would not eliminate the need for new right-of-way and land impacts, it would place the new impacts adjacent to existing cleared right-of-way. Collocation may allow some construction work area to overlap the existing easement, therefore reducing the area of new vegetation clearing required. The disadvantage of the reduced length of collocation for the alternative is made more significant because both the alternative and the proposed route in this area would cross mostly forested land. Collocation can also have negative impacts on some resources, for example when residential development has encroached near an existing utility or where affected landowners have multiple easements.

Other disadvantages of the Luzerne and Carbon Counties Alternative are 7 additional waterbody crossings, and clearing of about 15 acres additional forest land. For these reasons, we do not consider the Luzerne and Carbon Counties Alternative to be preferable to the proposed route.

3.3.1.2 Leidy Line Route Alternative (MPs 18.6–114.0)

In section 3.2.1.1 above, we evaluated the Transco Leidy Line system alternative which would include another company (Transco) expanding an existing pipeline system to replace the proposed PennEast Project. Here we evaluate an alternative that would involve PennEast constructing the Project, but routing the pipeline along the existing Transco Leidy Line right-of-way for its entire length. We received many comments that the pipeline should use existing rights-of-way as a means to avoid or reduce environmental impacts, and the Transco Leidy Line was mentioned as a specific opportunity to do that. We evaluated the Transco Leidy Line as a possible alternative to maximize routing the Project adjacent to an existing pipeline right-of-way.

The proposed route generally follows the Transco Leidy Line right-of-way from about MP 0 to MP 18.6. The Leidy Line Route Alternative would begin at MP 18.6 of the proposed route where it would continue to follow the Leidy Line for about 94.8 miles before reaching the existing Transco mainline pipeline in Princeton, New Jersey, about 6.3 miles northeast of the proposed Project terminus in Pennington, New Jersey. In response to our data requests, PennEast states that ending the Project at the Transco Pipeline in Princeton would be a viable alternative but it would require an extension of the pipeline of about 6.3 miles to connect to the proposed Project terminus in Pennington. In addition, PennEast has identified laterals from the Leidy Line alternative that would be required to connect to the proposed delivery points, and these laterals would add 44.7 miles of pipeline to the alternative. The general route of the Leidy Line Alternative, including the extension and laterals, is shown on figure 3.3.1-2.

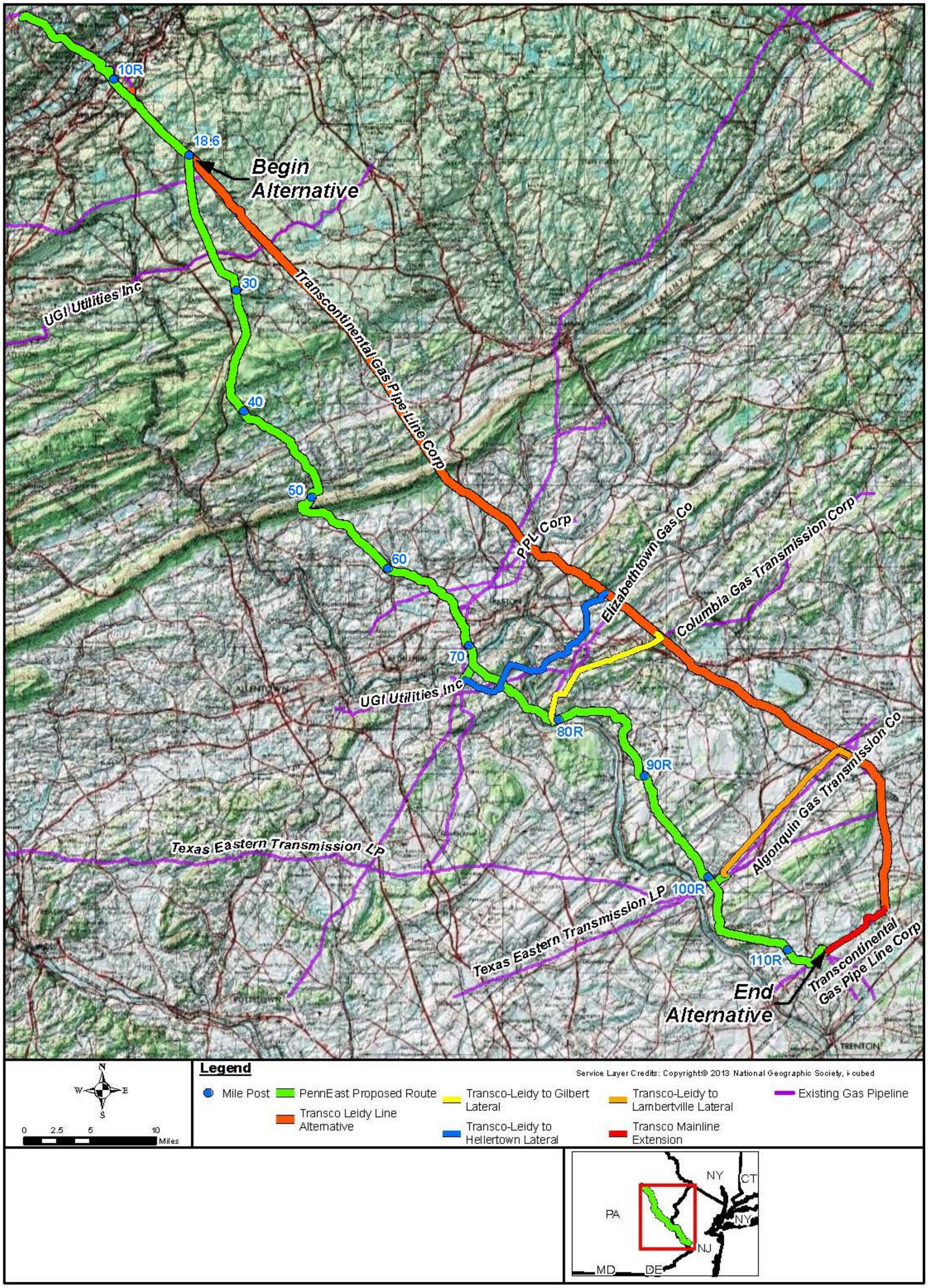

Figure 3.3.1-2 Leidy Line Route Alternative

Factoring in the extension and laterals, the Leidy Line Alternative would be about 54 miles longer, resulting in about 602 acres more disturbance during construction, and 142 acres more operational right-of-way, than the corresponding segment of proposed route. The alternative would impact about 118 acres of wetlands during construction compared to 24 acres by the corresponding segment of proposed route. In concept the alternative would be adjacent to existing right-of-way for the entire length adjacent to the Transco Leidy line and the extension (101.1 miles, 66 percent of the alternative including the laterals), compared to 37.1 miles (32 percent) for the corresponding segment of proposed route. The alternative would also be within 50 feet of an estimated 415 residences compared to 90 along the corresponding segment of proposed route. An environmental comparison of the Leidy Line Route Alternative to the corresponding segment of proposed route is provided in table 3.3.1-2.

TABLE 3.3.1-2

Comparison of the Leidy Line Route Alternative to the Proposed Route for the PennEast Pipeline Project

Environmental Factor a/	Leidy Line Alternative a/	Proposed Route
Length (miles)	152.4	98.7
Length Adjacent to Existing Rights-of-way (miles)	101.1	37.1
Construction Area (acres) b/	2,422	1,820
Operation Area (acres) c/	923	781
Residences within 50 feet of construction work space (number)	415	90
Forested Land Affected by Construction (acres)	1,047	1,083
Forested Land Affected by Operation (acres)	378	325
Wetlands Affected by Construction (acres)	118	24
Wetlands Affected by Operation (acres)	42	18
Waterbody crossings (number)	159	91
Special Interest Land Use Affected by Construction (acres)	344	150
Special Interest Land Use Affected by Operation (acres)	150	60

Notes:
a/ Includes 44.7 miles of laterals and 6.3 mile extension at southern end.
b/ Based on typical 125-foot-wide construction right-of-way.
c/ Based on a 50-foot-wide operational right-of-way.

The primary advantage of the Leidy Line Alternative is its greater collocation with existing right-of-way. The alternative would cross the Appalachian National Scenic Trail adjacent to an existing pipeline right-of-way, although the specific crossing location and potential crossing methods for the alternative have not been evaluated. The proposed route would cross the Appalachian National Scenic Trail in a location not collocated with existing right-of-way.

We received many comments concerned with the proposed route crossing of the Sourland Mountain region in New Jersey, which would be crossed near the southwest edge of the region between about MPs 102 – 104 of the proposed route. The Leidy Line Alternative would avoid this region, passing just to the north along its northeast edge.

Many comments that we received suggesting use of the Transco Leidy Line, or other existing utility rights-of-way, suggest that the pipeline should be placed entirely within the existing right-of-way. However, placing the proposed pipeline entirely within existing easements is generally not feasible, primarily because there is not enough space for the addition of the proposed pipeline and new required easement. The width of existing easements are limited to that needed to safely operate and maintain the utility and do not include extra width that would accommodate the PennEast pipeline. PennEast is requesting a new permanent easement width of 50 feet to operate and maintain the pipeline in accordance with DOT minimum safety standards. Therefore, we evaluated placing the PennEast pipeline adjacent to the Transco Leidy Line (collocation), as a potential method to minimize impacts on certain resources (e.g. forest habitat). Collocation may allow some construction work area overlap the existing easement therefore reducing the area of vegetation clearing required. Collocation can also have negative impacts on some resources, for example when residential development has encroached near an existing utility as discussed above, or where affected landowners have multiple easements.

The primary disadvantage of the alternative is the significantly greater number of residences that would be within 50 feet of construction work space (415), compared to the corresponding segment of proposed route (90). As part of our review of the Atlantic Sunrise Project (FERC 2016), we reviewed the potential for placing an additional pipeline along the Transco Leidy Line and concluded that collocation would not be feasible in certain areas due to the amount of commercial, industrial, and residential development that has occurred adjacent to Transco's existing right-of-way. We were unable to identify alternative alignments to avoid these developed areas that would not significantly increase the length of the pipeline and the overall construction footprint. In locations where there is limited work space between the existing pipeline and adjacent developments, it may be possible to use HDD technology to allow pipeline installation. However, even with installation using HDD, PennEast would still require a 50-foot-wide permanent easement above the pipeline during operation. HDD technology also requires extra work space at the start and end point of the segment installed by HDD, and construction-related impacts due to noise and activity are greater at HDD sites (see section 4.10.2). Therefore while in concept the alternative would maximize placement adjacent to an existing pipeline right-of-way, in actuality collocation would not be possible for much of the route.

As described above the Leidy Line Alternative would not serve as an alternative without the addition of a pipeline extension and lateral pipelines to access the proposed delivery point locations. The addition of these additional pipelines increases the overall length and related environmental impacts of the alternative. For these reasons, we do not consider the Leidy Line Alternative to be preferable to the proposed route.

3.3.1.3 Bucks County Alternative (MPs 75.8–99.3)

The Bucks County Alternative was identified and evaluated by PennEast as an early pipeline route (called the "original route" and also deviation no. 47) during Project siting. The alternative was evaluated as a potential route to minimize impact on standing structures, densely populated areas, and planned development projects. The alternative begins just west of the Delaware River Crossing and Riegelsville, Pennsylvania at MP 75.8 of the proposed route. The alternative would turn south and then southeast across mixed farm and woodland, staying within Bucks County, for about 11.5 miles before turning east to cross the Delaware River about 2 miles north of Point Pleasant, Pennsylvania. The alternative would then continue in a southeast direction in New Jersey, crossing mixed woodlands and farms, before rejoining the proposed route at MP 99.3. The alternative would include a lateral pipeline to the proposed Gilbert Interconnect which would require a crossing of the Delaware River. The general route of the Bucks County Alternative is shown on figure 3.3.1-3.

The alternative would be about 3.8 miles shorter, resulting in about 58.5 acres less disturbance during construction, and 23.4 acres less operational right-of-way, than the corresponding segment of proposed route. The alternative would impact about 2.4 acres of wetlands during construction compared to 6.3 acres by the corresponding segment of proposed route. No part of the alternative would be adjacent to existing right-of-way, compared to 5.5 miles (22 percent) for the corresponding segment of proposed route. The alternative would also be within 50 feet of 12 residences and cross 40 waterbodies, compared to 8 residences and 37 waterbodies along the corresponding segment of proposed route. An environmental comparison of the Bucks County Alternative to the corresponding segment of proposed route is provided in table 3.3.1-3.

TABLE 3.3.1-3

Comparison of the Bucks County Route Alternative to the Proposed Route for the PennEast Pipeline Project

Environmental Factor a/	Bucks County Alternative	Proposed Route
Length (miles)	20.7	24.5
Length Adjacent to Existing Rights-of-way (miles)	0	5.5
Construction Area (acres) a/	313.3	371.8
Operation Area (acres) b/	125.3	148.7
Residences within 50 feet of construction work space (number)	12	8
Forested Land Affected by Construction (acres)	195.6	157.3
Forested Land Affected by Operation (acres)	78.3	62.9
Agricultural Land Affected by Construction (acres)	91.5	174.8
Agricultural Land Affected by Operation (acres)	36.6	69.9
Wetlands Affected by Construction (acres)	2.4	6.3
Wetlands Affected by Operation (acres)	1.0	2.5
Waterbody crossings (number)	37	40
Special Interest Land Use Crossed (number)	1	1
Special Interest Land Use Affected by Construction (acres)	0.2	0.2
Special Interest Land Use Affected by Operation (acres)	0.1	0.1

Notes:
a/ Based on typical 125-foot-wide construction right-of-way.
b/ Based on a 50-foot-wide operational right-of-way.

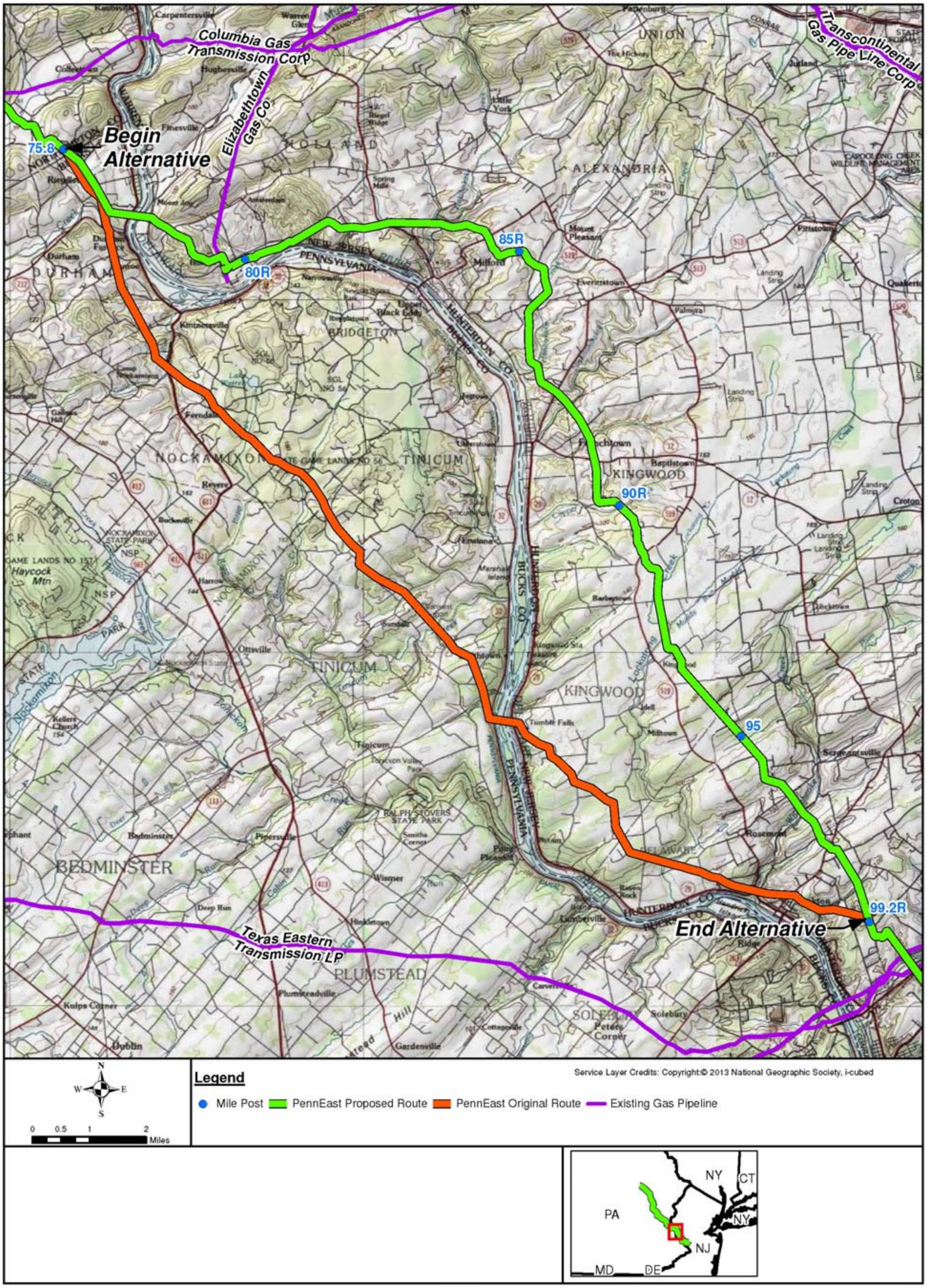

Figure 3.3.1-3 Bucks County Route Alternative

The primary advantage of the Bucks County Alternative is its shorter length and the reduced area of land disturbance that would result compared to the corresponding segment of proposed route. The alternative would also cross three less waterbodies, and affect less wetland and agricultural lands compared to the corresponding segment of proposed route. The primary disadvantage of the alternative is that it would not be adjacent to any existing rights-of-way, compared to about 5.5 miles (22 percent) for the corresponding segment of proposed route. The alternative would also affect more forested land, and would be within 50 feet of more residences than the corresponding segment of proposed route. The alternative would also require a lateral pipeline to connect to the Gilbert Interconnect, which would require a second crossing of the Delaware River. For these reasons, we do not consider the Bucks County Alternative to be preferable to the proposed route.

3.3.1.4 Harbourton Route Alternative (MPs 99.3–114.0)

The Harbourton Alternative is the southern portion of an early pipeline route (called the "original route") identified by PennEast during Project siting. The alternative would begin at MP 99.3 of the proposed route where it would turn east for about 1.8 miles to the site of the proposed Algonquin and TETCO interconnects, and then turn southeast and cross mixed woodland, farm, and residential areas for about 12.2 miles before reaching the Transco pipeline at a point about 0.4 mile north of the proposed Project end point. Because the alternative would pass adjacent to the proposed site of the Algonquin and TETCO interconnects, use of the alternative would avoid the need for the Lambertville Lateral. However, because the alternative would terminate north of the proposed Project end point, a 0.4-mile-long pipeline extension would be required to connect the pipeline to the proposed delivery site. The general route of the Harbourton Alternative is shown on figure 3.3.1-4.

The Harbourton Alternative would be about 0.1 mile shorter, resulting in about 16 acres less disturbance during construction, and 7 acres less operational right-of-way, than the corresponding segment of proposed route. The alternative would cross 31 waterbodies and impact about 14 acres of wetlands during construction compared to 21 waterbodies crossed and 4 acres of wetlands affected by the corresponding segment of proposed route. The alternative would be adjacent to existing right-of-way for about 1 mile (less-than 1 percent), compared to 11.1 miles (76 percent) for the corresponding segment of proposed route. The alternative would be within 50 feet of an estimated 41 residences compared to 90 residences along the corresponding segment of proposed route. An environmental comparison of the Harbourton Alternative to the corresponding segment of proposed route is provided in table 3.3.1-4.

The primary advantage of the Harbourton Alternative is its shorter length and the reduced area of land disturbance that would result compared to the corresponding segment of proposed route. The alternative would also be within 50 feet of fewer residences, about 41 compared to 90 along the corresponding segment of proposed route. The primary disadvantage of the alternative is that it would follow existing right-of-way for only 0.6 mile (less than 1 percent) compared to 11.1 miles (76 percent) for the corresponding segment of proposed route. The alternative would also impact more forest land and wetlands and require 10 more waterbody crossings than the corresponding segment of proposed route. For these reasons, we do not consider the Harbourton Alternative to be preferable to the proposed route.

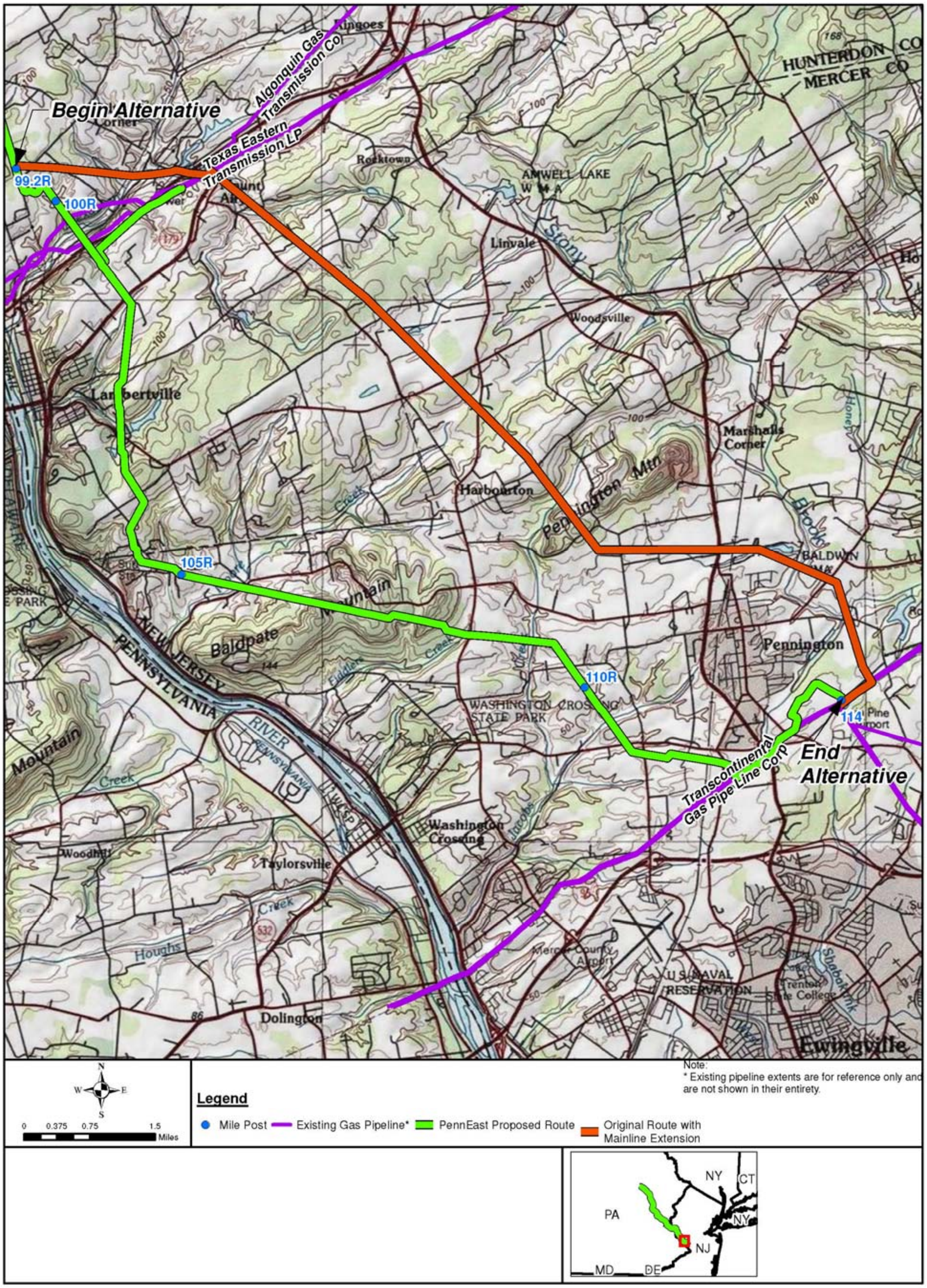

Figure 3.3.1-4 Harbourton Route Alternative

TABLE 3.3.1-4 Comparison of the Harbourton Alternative to the Proposed Route for the PennEast Pipeline Project		
Environmental Factor a/	**Harbourton Alternative**	**Proposed Route**
Length (miles)	14.6	14.8
Length Adjacent to Existing Rights-of-way (miles)	1.0	11.1
Construction Area (acres) a/	221	237
Operation Area (acres) b/	88	95
Residences within 50 feet of construction work space (number)	43	90
Forested Land Affected by Construction (acres)	119	71
Forested Land Affected by Operation (acres)	39	27
Wetlands Affected by Construction (acres)	14	4
Wetlands Affected by Operation (acres)	5	2
Waterbody crossings (number)	31	21
Special Interest Land Use Affected by Construction (acres)	13	8
Special Interest Land Use Affected by Operation (acres)	4	3

Notes:
a/ Based on typical 125-foot-wide construction right-of-way.
b/ Based on a 50-foot-wide operational right-of-way.

3.3.2 Route Variations

During the course of identifying its proposed route, PennEast evaluated a number of minor route changes or route variations, some of which it has adopted or incorporated into the proposed route. In many cases, the route variations were identified with input from or at the request of state agencies, municipalities, or landowners in an effort to avoid or minimize potential impacts on specific localized resources, including residences, planned future development, conservation easements, or waterbodies. FERC staff validated data supplied by PennEast and participated in field reconnaissance of certain route variations from the air and public access points. Maps of route variations evaluated are included in appendix F. Information on route variations, including location, general reasons for considering the variation, and if the variation has been incorporated into the proposed route, is provided in table 3.3.2-1. For any variations that have not been incorporated into the proposed route, table 3.3.2-1 includes an explanation for why the variation was not considered environmentally preferable to the corresponding segment of proposed route.

We received many comments during scoping questioning the pipeline routing in specific locations, and/or requesting review of route variations to avoid or minimize impacts on specific areas. The route alternatives discussed in section 3.3.1 address some of those concerns. Route variations listed in table 3.3.2-1 include potential alternatives for other areas identified as concern, including crossing of the Bethlehem Authority watershed district around Beltzville Lake (variation numbers 7, 9, and 1400); Appalachian National Scenic Trail (variations numbers 13, 14, 16-23, and 25), Gravel Hill preserve in Holland Township, New Jersey; (variation numbers 1701, 1705, and 1817); wellhead protection area in Alexandria Township, New Jersey (variation numbers 55 and 1806); and crossings of properties with USDA conservation easements (variation numbers

66, 67, and 78). Note that route variation naming conventions used in this EIS are the same used by PennEast in various filings with FERC.

We also received many comments that the pipeline should be placed entirely within an existing right-of-way, or rights-of-way, as a means to avoid or reduce environmental impacts. Placing the proposed pipeline entirely within existing easements is generally not feasible, primarily because there is not enough space for the addition of the proposed pipeline and new required easement. The width of existing easements are limited to that needed to safely operate and maintain the utility and do not include extra width that would accommodate the PennEast pipeline. PennEast is requesting a new permanent easement width of 50 feet to operate and maintain the pipeline in accordance with DOT minimum safety standards. However, placing the PennEast pipeline adjacent to existing easements (collocation) is generally considered a method to minimize impacts on certain resources (e.g. forest habitat) because some construction work area may overlap the existing easement and reduce the area of vegetation clearing required. Collocation can also have negative impacts on some resources, for example when residential development has encroached near an existing utility, or where affected landowners have multiple easements. Collocation is a factor considered for several variations listed in table 3.3.2-1 where appropriate.

In our analysis we evaluated impacts on environmental and human resources between variations and the proposed route. See section 4 of this EIS for a description of how the proposed pipeline would impact various environmental and human resources, and PennEast proposed measures and our additional recommended measures to avoid or reduce impacts.

TABLE 3.3.2-1

Pipeline Variations Evaluated for the PennEast Project

Variation Name	Milepost Location a/	Length (miles)	Reason Considered, or Primary Resources Affected or Avoided	Incorporated into Proposed Route	Reason Variation Incorporated or Rejected
Variation No. 1	5.0–5.6	0.6	Pond, cemetery	**Yes**	Avoids crossing a pond and avoids potential impacts on a cemetery
Variation No. 2	6.6–7.9	1.4	Proposed development plans	**Yes**	Avoids impact on future land development identified by landowner
Variation No. 3	7.3–8.3	1.1	Landowner request, tree clearing	No	0.2 mile longer, seven more residences within 50 feet
Variation No. 1005	9.0–12.1	2.9	Quarry, Mill Creek crossing	**Yes**	Reduces potential impact on quarry operation, better constructability at Mill Creek crossing, increases colocation by 0.1 mile
Variation No. 7	33.5–46.2	12.9	Bethlehem Authority watershed district and Beltzville Lake watershed	No	Less colocation (4.1 miles), more residences within 50 feet (75)
Variation No. 8	36.8–38.0	1.2	Landowner request	No	Engineering/safety constraints associated with crossing of Reservoir Road
Variation No. 9	39.7–51.1	10.3	Bethlehem Authority watershed district and Beltzville Lake watershed	No	Engineering constraints associated with crossing of Beltzville Lake

TABLE 3.3.2-1 Pipeline Variations Evaluated for the PennEast Project					
Variation Name	**Milepost Location a/**	**Length (miles)**	**Reason Considered, or Primary Resources Affected or Avoided**	**Incorporated into Proposed Route**	**Reason Variation Incorporated or Rejected**
Variation No. 10	40.8–42.1	1.3	Residential and landowner impacts	**Yes**	Reduced impact on Woods Campground, eliminates one High Consequence Area
Variation No. 11	42.5–43.2	0.9	Landowner request	No	0.2 mile longer, additional crossing of Bethlehem Water Authority land
Variation No. 1400	43.9–44.5	0.6	Bethlehem Authority water pipeline	**Yes**	Allows crossing of water pipeline as part of HDD for Beltzvillle Lake crossing
Variation Nos. 13, 14, 16-23	44.5–60.1	2.3-16.3	Appalachian National Scenic Trail (ANST) crossing, collocation, Blue Mountain Interconnect	No	Variations 13, 14, & 16-19 require an additional lateral to Blue Mountain delivery point, operational concerns due to proximity to existing pipelines, cross National Park Service parcels or easements. Variation 15 has constructability concerns. Variation 25 is considered preferred route at this location.
Variation No. 25	48.9-53.6	4.7	Appalachian National Scenic Trail (ANST) crossing, Blue Mountain Interconnect	**Yes**	Accommodates delivery point to Blue Mountain ski resort, avoids National Park Service parcels or easements at ANST crossing
Variation No. 15	44.2–51.1	5.9	Colocation with existing pipeline	No	More colocation with existing ROW (1.4 miles), but greater impact on residences within 50 feet (7)
Variation No. 24	48.7–51.1	2.7	Colocation with existing pipeline	No	More colocation with existing ROW (0.5 mile), but 0.2 mile longer overall, 9.4 acres more forest clearing, and two more residences within 50 feet
Variation No. 26	54.2–57.5	3.3	Landowner request	No	One more waterbody crossing, and slightly more wetland area affected (0.2 acre)
Variation No. 27	54.9–55.3	0.4	New residence	**Yes**	Avoids impact on recently constructed residence
Variation No. 28	55.6–56.2	0.6	Future development plans	**Yes**	Avoids impact on future development
Variation No. 29	61.2–61.7	0.6	Sensitive areas	No	0.1 mile longer, one residence within 50 feet, Field surveys determined variation would not reduce impact on sensitive areas
Variation No. 30	61.7–62.7	1.0	Future development plans	**Yes**	Avoids impact on future developments
Variation No. 31	61.7–64.0	2.3	Future development plans	**Yes**	Avoids impact on future developments
Variation No. 32	62.8–63.9	1.0	Sensitive areas	No	Field surveys determined variation would not reduce impact on sensitive areas
Variation No. 33	64.3–65.0	0.7	Future residence plans	**Yes**	Avoids impact on future development
Variation No. 34	67.6–71.6	4.0	Lehigh River crossing, housing development, St. Luke's Hospital expansion	**Yes**	Avoids new housing development and hospital expansion plans, and improves alignment for HDD of Lehigh River

TABLE 3.3.2-1 Pipeline Variations Evaluated for the PennEast Project					
Variation Name	**Milepost Location a/**	**Length (miles)**	**Reason Considered, or Primary Resources Affected or Avoided**	**Incorporated into Proposed Route**	**Reason Variation Incorporated or Rejected**
Variation No. 35	67.6–67.8	0.2	Future residence plans	**Yes**	Avoids septic field for future residential construction
Variation No. 36	67.6–68.1	0.4	Existing septic system and future residence plans	**Yes**	Avoids existing septic system and future residential construction
Variation No. 37	68.9–69.5	0.6	Future development plans	**Yes**	Avoids impact on future development
Variation No. 38	69.4–71.6	2.2	Housing development, St. Luke's Hospital expansion	**Yes**	Avoids new housing development and hospital expansion plans
Variation No. 39	69.4–69.7	0.4	Future expansion of Penn DOT facility	**Yes**	Avoids impact on future expansion of Penn DOT facility
Variation No. 40	71.6–79.7	11.1	Co-location with pipeline easement	No	2.8 miles longer, more residences within 50 feet (9), engineering constraints associated with Delaware R. crossing
Variation No. 41	73.1–73.2	0.2	Landowner request	No	Would move pipeline construction work space to within 50 feet of one residence
Variation No. 42	75.0–75.5	0.4	Landowner request	No	The proposed route in this location addresses concerns identified by the landowner
Variation No. 43	74.5–75.8	0.3	Sensitive areas	**Yes**	Reduced potential impact on environmentally sensitive area
Variation No. 44	74.6–76.8	2.4	Sensitive areas	No	Would move pipeline construction work space to within 50 feet of one residence, increase conservation easement impacts by 13.1 acres
Variation No. 45	75.0–75.6	0.6	Landowner request	**Yes**	Avoids areas of concern on landowner property
Variation No. 46	75.2–76.2	1.0	Landowner request	No	Would move pipeline construction work space to within 50 feet of two residences
Variation No. 1704	78.7–79.7	1.1	C-1 waterbody, forested wetland, preserved farmland	**Yes**	Avoids crossing C-1 waterbody and associated forested wetland, and a preserved farmland, and reduces side-slope construction
Variation No. 1701	79.1–81.6	2.5	Gravel Hill preserve	**Yes**	Increases colocation by 1.5 miles
Variation No. 49 (Gilbert Lateral)	0–0.5	0.4	Landowner request	No	Would move pipeline construction work space to within 50 feet of two residences
Variation No. 1705	79.6–82.0	3.0	Gravel Hill preserve	No	0.1 mile longer, more forest land impact, , more residences within 50 feet (16), construction and operation impacts associated with pipeline installation within public roadway
Variation No. 1817	80.4–82.3	4.5	Gravel Hill preserve	No	2.3 miles longer, more residences within 50 feet (46), crosses five C-1 streams, construction and operation impacts associated with pipeline installation within public roadways

TABLE 3.3.2-1

Pipeline Variations Evaluated for the PennEast Project

Variation Name	Milepost Location a/	Length (miles)	Reason Considered, or Primary Resources Affected or Avoided	Incorporated into Proposed Route	Reason Variation Incorporated or Rejected
Variation No. 51	78.7-82.4	3.7	Landowner request to avoid future development	**Yes**	Avoids area identified for future development, more colocation (1.2 miles)
Variation Nos. 52 – 53	78.7–82.6	3.7-3.9	Landowner request to avoid future development	No	Both variations have less colocation than proposed route, Variation 51 identified as proposed route in this location.
Variation No. 54	82.0–82.3	0.4	Landowner request to avoid future development plans	No	Proposed route in this area would not impact future development, Variation 51 incorporated into proposed route in this area
Variation No. 1802	84.6–86.5	1.9	Federally-preserved farm	**Yes**	Avoids crossing federally preserved farm
Variation No. 1808	86.6–87.1	0.5	Green Acres easement	**Yes**	Avoids crossing a parcel with Green Acres conservation easement
Variation No. 55	86.7-88.0	1.3	Wellhead protection area	No	More impact on forested wetlands, crosses horse farm, and one additional Green Acres-encumbered parcel
Variation No 1806	86.4-88.1	3.0	Wellhead protection area	No	0.6 mile longer, crosses three additional parcels with farmland preservation easements
Variation No. 1907	89.6–90.8	1.2	Green Acres easement, wetland and forest land	**Yes**	Avoids crossing a parcel with Green Acres conservation easement and reduces crossings of wetland and forest land
Variation No. 58	90.8–91.2	0.4	Landowner request to avoid septic system	**Yes**	Addresses routing concerns identified by landowner
Variation Nos. 59–63	91.3–93.0	1.4-1.9	Lockatong Creek crossing	No	Variation No. 1900 is preferred route in this location.
Variation No. 1900	91.9-93.6	1.7	Lockatong Creek cossing	**Yes**	Avoids crossing Lockatong Creek three times, avoids crossing a federally preserved farm and and Green Acres protected parcel
Variation No. 65	93.1–93.7	1.3	Colocation in public roadways, wetland impacts	No	Construction and operation impacts associated with pipeline installation within public roadways, four additional residences within 50 feet of construction work space
Variation No. 66	93.2–94.3	1.1	USDA conservation easement	**Yes**	Avoids parcel with USDA conservation easement
Variation No. 67	97.1–97.8	0.7	USDA conservation easement	**Yes**	Avoids parcel with USDA conservation easement
Variation No. 68	97.4–97.6	0.4	Co-location, wetland impacts	No	Construction and operation impacts associated with pipeline installation within public roadway, one additional residence within 50 feet of construction work space
Variation No. 1913	99.0–101.0	2.0	C-1 streams, colocation	**Yes**	Avoids paralleling C-1 stream and riparian area, improves crossing location of one C-1 stream, increases colocation with existing ROW

TABLE 3.3.2-1 Pipeline Variations Evaluated for the PennEast Project					
Variation Name	**Milepost Location a/**	**Length (miles)**	**Reason Considered, or Primary Resources Affected or Avoided**	**Incorporated into Proposed Route**	**Reason Variation Incorporated or Rejected**
Variation No. 70 and 71 (Lambertville Lateral)	0.0–1.0	1.0–1.1	Safety considerations for Lambertville Launcher site	No	Both variations would be longer than proposed route (Variation 73)
Variation No. 73 (Lambertville Lateral)	0.0-1.4	1.4	Safety considerations for Lambertville Launcher site	**Yes**	Addresses engineering and constructability concerns associated with colocation with overhead powerlines and pipelines
Variation No. 2000	101.3–101.7	0.4	Forest clearing, colocation	**Yes**	Moves pipeline to other side of existing ROW to move further from a parallel waterbody and forested wetland
Variation No. 74	102.3–102.6	0.4	Colocation with powerline ROW	**Yes**	Reduces forest impacts by 1.8 acres
Variation No. 75	102.8-103.8	1.0	Future development plans, sensitive areas	No	Constructability issues due to topography, two additional residences within 50 feet of construction work space
Variation No. 76	103.3-104.0	0.7	Future development plans, sensitive areas	**Yes**	Avoids impact on future land development plans along Hewitt Road
Variation No. 77	107.4–108.1	0.7	Pond	**Yes**	Avoids crossing of pond
Variation No. 78	108.7–108.9	0.2	USDA conservation easement	**Yes**	Avoids parcel with USDA conservation easement
Variation No. 79	110.5–110.9	0.6	Hopewell Township public works facility	No	PennEast proposes alternative crossing method (HDD) to avoid impacts
Variation No. 2102	112.0–112.7	0.7	Proposed land development plans	**Yes**	Avoids impacts on land development plans, increase colocation by 0.3 mile
Variation No. 2100	112.9–113.5	0.8	Proposed land development plans, Green Acres conservation easement, colocation with existing ROW	**Yes**	Reduces impacts on planned developments, increases colocation by 0.2 mile
Variation No. 80	113.5–113.9	0.4	Landowner request	**Yes**	Addresses routing concerns identified by landowner

Note:
a/ Start and end mileposts along the proposed route.

3.4 ABOVEGROUND FACILITY ALTERNATIVES

We evaluated the locations of the proposed aboveground facilities to determine whether environmental impacts would be reduced or mitigated by the use of alternative facility sites. Our evaluation included review of desktop material, information provided by PennEast in its application materials, and site visits along the Project corridor. We also evaluated a design alternative for the Kidder Compressor Station.

3.4.1 Compressor Station Site Alternative

PennEast proposes to construct one new compressor station, The Kidder Compressor Station, at MP 26.7 in Carbon County, Pennsylvania. PennEast identified one alternative site for the compressor station, located at MP 25.9 of the proposed route (also referred to as "option 1", see figure 3.4-1).

The alternative site would be about 0.8 mile north of the proposed site, and both the proposed and alternative sites would require a new access road constructed to the site from Route 940. Both sites are primarily forested, and the proposed site would require about 34 acres of disturbance during construction, whereas the alternative site would require about 26 acres during construction. An environmental comparison of the alternative site to the proposed compressor station site is provided in table 3.4.1-1.

TABLE 3.4.1-1

Comparison of Compressor Station Site Alternative to Proposed Kidder Compressor Station Site Project

Environmental Factor	Compressor Station Alternative 1	Proposed Compressor Station Site
Construction Area (acres)	26	34
Operation Area (acres)	23	26.2
Forested Land Affected by Construction (acres)	25	31.4
Forested Land Affected by Operation (acres)	23	24.8
Active Agricultural Land Affected by Construction (acres)	0	0
Active Agricultural Land Affected by Operation (acres)	0	0
Wetlands Affected by Construction (acres)	0.2	1.4
Wetlands Affected by Operation (acres)	0.2	1.4
Waterbodies Affected by Construction (number)	1	0
Special Interest Land Use Affected (number)	0	0
Noise Sensitive Areas Within 1 Mile	5	5
Nearest Noise Sensitive Area (feet)	1,000	1,920

The proposed site for the Kidder Compressor Station is zoned light industrial, whereas the alternative site would require a zoning change to be approved by Kidder Township. The alternative site and access road would be adjacent to or within approximately 500 feet from several commercial and residential properties located along Route 940, and about 1,000 feet west from one of the fairways of the Jack Frost golf course. By comparison, the proposed compressor station site is about 1,000 feet south of the developments along Route 940, and at the closest point is over 2,500 feet southwest of the Jack Frost golf course. We received comments concerning zoning, noting that the alternative site is not zoned for industrial development, and use of this site for the compressor station would negatively affect the adjacent residential areas.

The proposed site is in close proximity to the I-80 westbound travel lanes which has an elevated ambient noise level due to traffic (see section 4.10.2 of this EIS for additional discussion of noise).

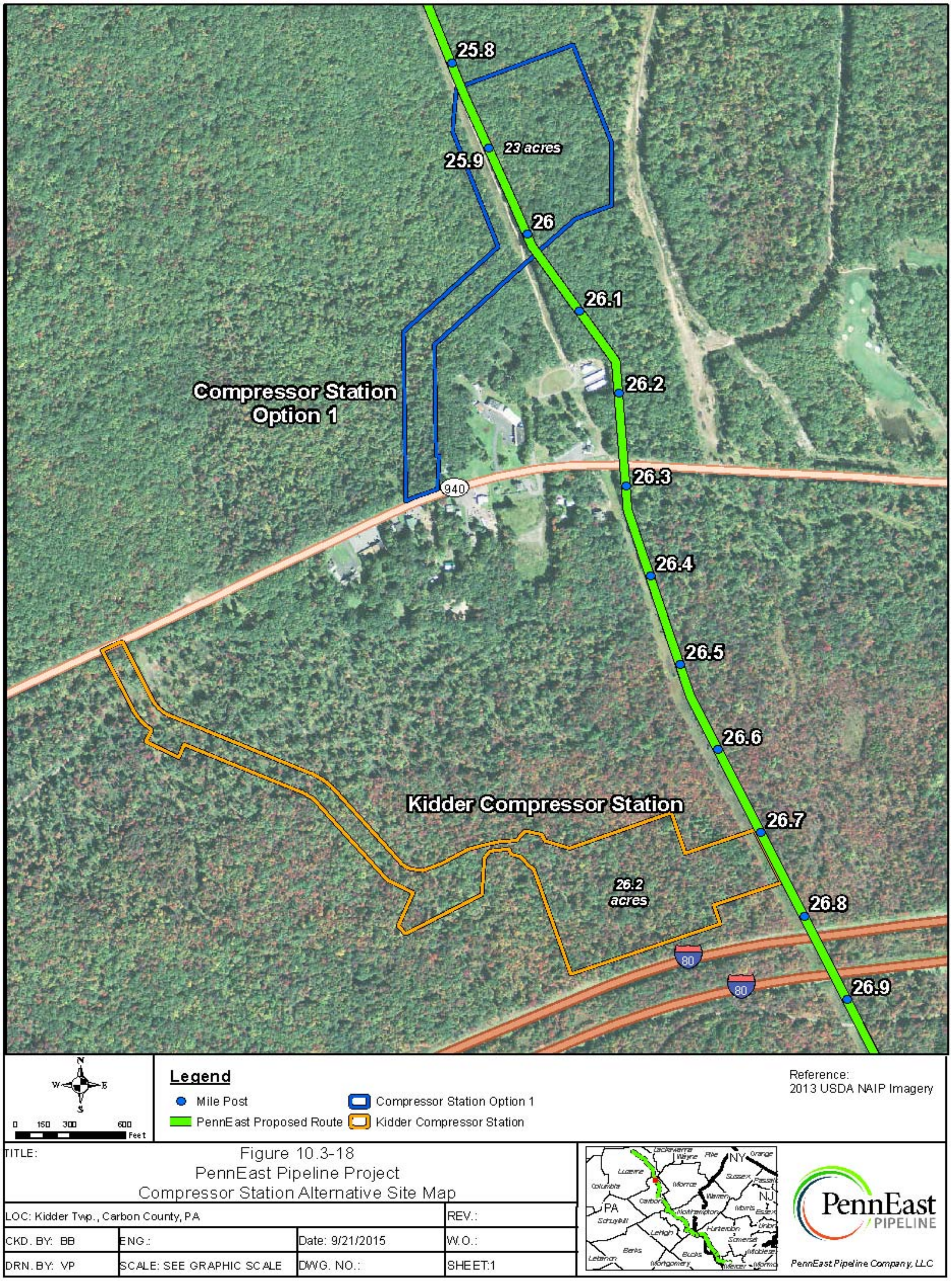

Figure 3.4-1 Compressor Station Site Alternative

Although the proposed site would affect more forested land and wetlands, it is zoned light industrial and abuts I-80, and is further from the nearest NSA than the alternative site. For these reasons, we do not consider the alternative site to be preferable to the proposed Kidder Compressor Station site.

3.4.2 Compressor Station Design Alternative

FERC staff asked PennEast to evaluate the feasibility of installing electric motor driven compressor units at the Kidder Compressor Station instead of the proposed natural gas-fired compressor turbines. In general, the advantage of using electric compressor motors would be a reduction in air emissions from the station. We also received comments suggesting this alternative should be evaluated.

Electric compressor motors would require approximately 35 to 40 megawatts (MW) of electrical power, and would be technically feasible after upgrading the local substation and transmission lines to the compressor station. However, use of electric motors as an alternative to natural gas-driven compressors would result in higher overall emissions, due to emissions created by generation of the needed electricity. See further discussion in section 4.10.1.4 of this EIS. In addition, use of electric motor-driven compressor units would result in additional impacts from construction of the needed electric transmission service to the site. For these reasons, we do not consider electric motor driven compressor units to be preferable to the proposed natural gas-fired compressor turbines.

4.0 ENVIRONMENTAL ANALYSIS

4.1 GEOLOGY

4.1.1 Geologic Setting

The proposed Project is located within four physiographic provinces: the Appalachian Plateaus Province, Ridge and Valley Province, New England Province, and the Piedmont Province. The Project crosses the Glaciated Low Plateau and the Glaciated Pocono Plateau Sections of the Appalachian Plateaus Province; the Anthracite Valley, Anthracite Upland, Blue Mountain, and Great Valley Sections of the Ridge and Valley Province; the Reading Prong Section in Pennsylvania and the Highlands Section in New Jersey of the New England Province; and the Gettysburg-Newark Lowland Section of the Piedmont Province (Sevon 2000). The physiographic province sections are described below in the general order that they are encountered by the pipeline beginning at MP 0.0.

The Glaciated Low Plateau Section of the Appalachian Plateaus Province consists of rounded hills and broad to narrow valleys, modified by glacial erosion and deposition. The more erosion-resistant bedrock form the hills and the less erosion-resistant bedrock occur in the valleys. Glacial deposits, mainly glacial till or sand and gravel, are found mainly in the valley bottoms and margins. The Anthracite Valley Section of the Ridge and Valley Province is a narrow to wide, canoe-shaped valley that is enclosed by a steep-sloped mountain rim. Elevations can range from 500 to 2,368 feet. The bedrock is composed of sandstone, siltstone, conglomerate, and anthracite coal. The Project crosses this physiographic province in Luzerne County, Pennsylvania.

The Glaciated Pocono Plateau Section of the Appalachian Plateaus Province is a broad upland underlain by erosion-resistant sandstones that are relatively flat lying. Relief on the upland is generally less than 200 feet, but can be as much as 600 feet where small hills rise above the general level of the upland. Elevations on the upland range from 1,200 to 2,320 feet (Sevon 2000). The Project crosses this physiographic province in Luzerne and Carbon counties, Pennsylvania.

The Anthracite Upland Section of the Ridge and Valley Province consists of an upland that has low, linear to rounded hills. The dominant bedrock types are sandstone, siltstone, conglomerate, and anthracite coal. The local relief ranges from low to high; the range in elevation is from 320 feet to 2,094 feet (Sevon 2000). The Project crosses this physiographic province in Carbon County, Pennsylvania.

In the Blue Mountain and Anthracite Upland Sections of the Ridge and Valley Province, ridges are composed of relatively erosion-resistant sandstone bedrock capped with residuum. Valley sediments are chiefly composed of alluvium deposited from more erodible siltstones. Hillsides typically have a thicker mantle of colluvium deposits towards the base of the slope. Ridges and hillsides may also be exposed bedrock outcrops (Sevon 2000). The Blue Mountain Section of the Ridge and Valley Province consists of a linear ridge and moderate to high relief. Local relief is moderate to high. Sandstone, siltstone, and shale form this Section. The Project crosses this physiographic province in Carbon and northernmost Northampton counties, Pennsylvania.

The Great Valley Section of the Ridge and Valley Province consists of very broad lowland that has gently undulating hills eroded into shales and siltstones on the north side of the valley and a flatter landscape of lower elevation developed on limestones and dolomites on the south side. In general, local relief is less than 100 feet in the carbonate area, but may be up to 300 feet in the shale area. Elevation ranges from 140 feet to 1,100 feet. The Project crosses this physiographic province in Northampton County, Pennsylvania.

The Reading Prong and Highlands Sections of the New England Province consists of circular to linear, rounded low hills or ridges that project upward in significant contrast to the surrounding lowlands. The hills and ridges are made up of granitic gneiss, granodiorite, and quartzite. These rocks are very resistant to erosion and stand higher than the softer sedimentary rocks that surround them. Local relief is 300 to 600 feet and elevations range from 140 to 1,364 feet (Sevon 2000). The Project crosses through the Reading Prong Section of this physiographic province in Northampton and Bucks counties, Pennsylvania and the Highlands Section in Hunterdon County, New Jersey.

The Gettysburg-Newark Lowland Section of the Piedmont Province consists mainly of rolling, low hills and valleys developed on red sedimentary rock (mainly red shale, siltstone, and sandstone) deposited in a long, narrow, inland basin, collectively known as the Newark Basin. Characteristics of the Newark basin are Triassic-Jurassic age sedimentary rocks that are intruded by Jurassic-age igneous dikes and sills (diabase) in both Hunterdon and Mercer Counties. This Section also contains isolated higher hills. Relief is generally 100 to 200 feet with localized areas of up to 600 feet on isolated hills (Sevon 2000). The Project crosses this physiographic section in Bucks County, Pennsylvania and Hunterdon and Mercer Counties, New Jersey.

4.1.2 Surficial Geology

In Luzerne County, Pennsylvania, the surficial geology crossed by the proposed Project is the Glaciated Low Plateau and Pocono Plateau sections of the Appalachian Plateaus Province discussed above in Section 4.1.1. The surficial geology is comprised mainly of glacial till with intermittent associated glacial deposits of stratified drift, ice-contact and associated swamp bog deposits with numerous bedrock outcrops

The surficial geology of Carbon, Northampton, and Bucks counties, Pennsylvania, consists of a variety of locally derived deposits in situ (saprolite), glacial, fluvial, and mass-wasting processes. Valley sediments are chiefly composed of alluvium. Hillsides typically have a thicker mantle of colluvium deposits towards the base of the slope with the ridges and slopes having exposed bedrock outcrops. Minor amounts of glacially derived deposits intersperse the area (PADCNR 2015a).

The PennEast pipeline and laterals cross saprolites, colluvium, and alluvium of locally derived bedrock through the New Jersey portion.

A review of surficial geologic maps provided information regarding the texture, grain size and parent material of unconsolidated material expected in the Project area (PADCNR 2015a, NJDEP 2015a). Appendix G-1 summarizes surficial geology in the vicinity of the proposed pipeline and aboveground facilities.

The overall effect of the Project on surface geology would be minor. The effects would mostly be limited to construction activities and would include temporary disturbance to surficial deposits within the right-of-way resulting from grading and trenching. PennEast would minimize the impacts on surface geology by returning the native material back into the construction trench, and returning contours to preconstruction conditions to the maximum extent practicable immediately after construction. At the aboveground facilities, where grading and filling may be required to create a safe and stable land surface to support the facility and allow for stormwater drainage, this may not be possible. However, these impacts would be minor and would not change overall geologic conditions.

4.1.3 Bedrock Geology

A review of bedrock geologic maps provided information regarding the nature of bedrock geologic units expected in the Project area (PADCNR 2015a, NJDEP 2015a). Appendix G-2 summarizes bedrock geology in the vicinity of the proposed pipeline and aboveground facilities, respectively. Bedrock geology of the Project area is dominated by sedimentary rocks with limited amounts of metamorphic and igneous rock.

In Pennsylvania, the bedrock units crossed by the proposed Project are mostly sedimentary units and include sandstone, siltstone, shale, mudstone, conglomerate, limestone, and dolomite. However, in a few places in Northampton County, the Project would cross metamorphic bedrock consisting of felsic-to-mafic gneiss, hornblende gneiss, and quartzite.

In New Jersey, the sedimentary units crossed include sandstone, siltstone, shale, mudstone, and dolostone, often intruded by diabase dikes and sills. The metamorphic and igneous bedrock units that would be crossed include hornblende granite, quartz-oligoclase gneiss, and quartzite. The granites intrude the metamorphic rocks.

The effect to bedrock geology would be minor. The primary effects would be associated with areas of shallow bedrock where rock would need to be removed by ripping, hammering, or blasting during the construction of pipeline facilities, which in most cases would be limited to the pipeline trench and within 8-10 feet of the surface. See section 4.1.6 for more information on areas of shallow bedrock and mitigation measures that would be taken during rock removal.

4.1.4 Mineral Resources

Mineral resources in the Project area include crushed stone, cement, tripoli, lime, and sand and gravel production PADNCR 2015b).

In Luzerne County, Pennsylvania, between MP 5.0 and 11.3, PennEast has identified 27 abandoned or reclaimed mines related to or active in coal mining near the pipeline. These mines are listed in table 4.1.4-1 and include the distance to the Project.

No other abandoned or reclaimed mines were identified along the pipeline route. Where the available information indicates that mines are likely to exist below the pipeline alignment, PennEast would drill borings for confirmation and to determine the length of the pipeline section that would be affected. Mitigation and remedial measures would be implemented, as needed, to minimize the risk of subsidence due to underground mines in accordance with USDOT standards as discussed in the Karst Mitigation Plan.

TABLE 4.1.4.1						
Abandoned and Reclaimed Mines within 0.25 Mile of the Project Area						
County	Municipality	Name	Status	Approx. MP	Distance From Centerline (feet)	Distance From Workspace (feet)
LUZERNE	WEST WYOMING BORO	2229-13	Abandoned	5.0	680.4	622.5
LUZERNE	WEST WYOMING BORO	2229-14	Abandoned	5.0	573.7	513.0
LUZERNE	WEST WYOMING BORO	3028-06	Reclamation Complete	5.2	220.6	155.6
LUZERNE	WEST WYOMING BORO	3028-14	Reclamation Complete	5.2	172.6	137.6
LUZERNE	WEST WYOMING BORO	3028-12	Reclamation Complete	5.2	505.7	440.7
LUZERNE	WEST WYOMING BORO	3028-15	Reclamation Complete	5.3	88.1	53.1
LUZERNE	WEST WYOMING BORO	3028-16	Reclamation Complete	5.3	36.9	1.9
LUZERNE	WEST WYOMING BORO	3028-11	Abandoned	5.3	276.4	211.4
LUZERNE	WEST WYOMING BORO	2229-10	Reclamation Complete	5.3	870.1	323.6
LUZERNE	WEST WYOMING BORO	3028-13	Reclamation Complete	5.4	20.2	0.0
LUZERNE	JENKINS TWP	2172-01	Abandoned	7.4	23.3	0.0
LUZERNE	PLAINS TWP	1814-02	Abandoned	8.0	558.6	483.6
LUZERNE	PLAINS TWP	2165-14	Reclamation Complete	8.4	1302.3	328.0
LUZERNE	PLAINS TWP	1573-15	Abandoned	9.3	3336.1	536.3
LUZERNE	LAFLIN BORO	1573-08	Abandoned	9.5	1559.2	577.8
LUZERNE	PLAINS TWP	1573-06	Abandoned	9.6	1098.0	639.9
LUZERNE	PLAINS TWP	2240-07	Abandoned	9.6	7393.2	1077.7
LUZERNE	LAFLIN BORO	1573-11	Abandoned	10.0	335.8	225.8
LUZERNE	JENKINS TWP	1573-14	Reclamation Complete	10.2	453.4	388.4
LUZERNE	PLAINS TWP	2240-01	Abandoned	10.2	6454.3	315.7
LUZERNE	JENKINS TWP	1573-12	Reclamation Complete	10.2	172.5	82.5
LUZERNE	PLAINS TWP	1573-09	Abandoned	10.3	2364.5	988.0
LUZERNE	PLAINS TWP	2240-02	Abandoned	11.2	4005.3	761.6
LUZERNE	PLAINS TWP	2240-05	Abandoned	11.3	3843.4	1138.9
LUZERNE	PLAINS TWP	4193-03	Reclamation Complete	11.3	4426.0	1177.8
LUZERNE	PLAINS TWP	2240-03	Abandoned	11.3	4008.2	1242.0
LUZERNE	PLAINS TWP	4193-02	Abandoned	11.3	4293.8	1274.8

Source: http://www.pasda.psu.edu/ & http://www.state.nj.us/dep/njgs/geodata/dgs03-2.htm

Two active quarries that mine aggregate are located in Luzerne County within 0.25 mile of the Project area: Pioneer Aggregates, Inc. located at MP 9.2 and Wilkes-Barre Materials, LLC located near MP 9.6. PennEast has contacted the quarry owners and aligned the pipeline to avoid future expansion plans of these quarries. PennEast evaluated average quarry blasting vibration and found there should be no effect on the pipeline from these activities on the pipeline.

There are two active industrial mineral quarries approximately 4 miles from the pipeline: Tarheel Quarry, LLC located in Luzerne County near MP 23.5, and Buzzi Unicem Imperial Quarry located in Northampton County near MP 60.5.

There are no mines or quarries located within 0.25 mile of the Project in New Jersey. However, Trap Rock Industries operates three crushed stone quarries within about 2.5 miles of the pipeline: in Lambertville and Delaware townships approximately 0.55 mile from MP 99.4; in Titusville, approximately 0.6 mile from MP 102.5; and in Pennington, approximately 2.3 miles from MP 106.5.

PennEast has been in contact with Trap Rock Industries regarding future quarry expansion plans, has reviewed available records, and has conducted an evaluation of the effects of potential future quarry blasting near the proposed pipeline, specifically at a location nearest to the pipeline alignment at MP 99.4 to 99.5 in Delaware Township, New Jersey[11]. Based on this contact, review, and evaluation, the current distance and operation of these quarries would not impact Project construction of the pipeline, and there are no anticipated impacts or compromise to the integrity of the operation of the pipeline from potential quarry expansion and operation. PennEast based this assessment on site-specific data (geology, distance, and wave propagation) and a scaling relationship developed by Orarid (1994)[12] to solve for blast-induced peak particle velocity (PPV) for the nearest receptor (pipeline) and the vibration threshold that the receptor can accept. Based on the potential for the Trap Rock Quarry to expand its quarry operations to a separation distance of 2,000 feet from the pipeline, the PPV experienced at the pipeline would be approximately 0.0026 inches per second. If the quarry were to expand to 1,300 feet of the pipeline, the PPV experienced at the pipeline would be approximately 0.005 inches per second.[13] For comparison, a limit of 0.5 inches per second is normally used for the protection of historic structures from blast-induced PPV.

In New Jersey, the damage-limiting threshold is based on a PPV of 2 inches per second[14]. By rearranging the scaling relationship equation to solve for the minimum separation distance based on a PPV limit of 2 inches per second, a safe separation distance of 32 feet between the pipeline and blasting should be maintained to avoid pipeline safety concerns.

4.1.4.1 Oil and Gas Wells

While the recent shale oil and gas development has greatly increased the number of oil and gas wells in Pennsylvania within the last several years, activity within the Marcellus Shale in Luzerne and Carbon counties is limited; and no drilling has occurred in New Jersey (Sourcewatch.org 2015). There are no mapped locations of oil and gas wells within 0.25 mile of the Project.

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[11] PennEast Pipeline Company, LLC filing to FERC Project Docket CP15-558-000 on June 21, 2016. Accession Number 20160621-5191.

[12] Oraird 1994. Vibration and Ground Rupture Criteria for Buried Pipelines. Proceedings of the Twentieth Annual Conference on Explosives and Blasting Technique, International Society of Explosive Engineers.

[13] New Jersey General Assembly, June 15, 2016. Comment letter to FERC Commissioner Chairman from Assemblyman Jack M. Ciattarelli. FERC Docket CP15-558-000 Accession Number 20160624-0015.

[14] N.J.A.C. 12:190-7.26(c).

Following construction of the pipeline, gas well drilling in the permanent right-of-way would be prohibited. If future gas well development were to be conducted in Luzerne or Carbon counties, Pennsylvania in the proximity of the pipeline, or if access to these well sites would require crossing the pipeline, PennEast would ensure that proper construction techniques were followed to protect the integrity of the pipeline. Therefore, it is not expected that the PennEast pipeline or aboveground facilities would negatively impact future development of gas wells in the area of the Project.

4.1.5 Geologic Hazards

Geologic hazards are natural, physical conditions that can result in damage to land and structures or injury to people. Such hazards typically include seismicity (e.g., earthquakes, surface faults, soil liquefaction), landslides, flash flooding, and ground subsidence. Conditions necessary for the development of other geologic hazards, including avalanches and volcanism, are not present in the Project area. Areas underlain by karst deposits would be extensively evaluated to insure that the PennEast pipeline and laterals are constructed using BMPs for work conducted in karst terrain and engineered to account for conditions mostly related to ground subsidence.

4.1.5.1 Seismicity and Faults

The majority of significant earthquakes around the world are associated with tectonic subduction zones, where one crustal plate is overriding another (e.g., the Japanese islands), where tectonic plates are sliding past each other (such as California), or where tectonic plates are converging (e.g., the Indian Sub-Continent). Unlike these highly active tectonic regions, the east coast of the United States is a passive tectonic plate boundary located on the "trailing edge" of the North American continental plate, which is relatively seismically quiet.

However, earthquakes do occur in the Project area, largely due to trailing edge tectonics and residual stress released from past orogenic (mountain-building) events. The greatest seismic risk to the Project is near the Ramapo Seismic Zone. The Ramapo Fault extends from Pennsylvania and New Jersey into southern New York. The Ramapo Fault is part of a system of northeast-striking faults that were active during the early to mid Mesozoic Era, approximately 200 million years ago. The fault system is a remnant of an active extensional tectonic boundary (half-graben) that once existed in the area, and now constitutes the western boundary of the Newark Basin. The USGS has extensively studied the Ramapo Fault system and the level of seismicity in the region. The USGS's review of data for evidence of Quaternary Period fault activity (i.e., within the last 1.8 million years) encompassing the eastern United States indicates that there is no clear association between the fault and small earthquakes that occur in the region. Further, there is no authoritative geologic evidence to indicate the existence of Holocene-age faulting, slip or deformation associated with the fault.

Seismic risk can be quantified by the motions experienced by the ground surface or structures during a given earthquake, expressed in terms of gravity (g). According to the USGS a peak ground acceleration (PGA) of 10 percent of gravity is generally considered the minimum threshold for damage to older structures or structures not made to resist earthquakes The PGA for the pipeline route with a 10 percent incidence per 50 years (recurrence interval of 1:475 years) ranges from 3 to 5 percent g (USGS 2009). Based on USGS information, seismic hazard is low.

The recorded magnitude of earthquakes in the Project area is relatively low and the ground vibration would not pose a problem for a modern welded-steel pipeline (FEMA 1992). Based on the low seismic risk and occurrence assigned to the Project area, and the lack of Recent (Holocene-age) faulting, we find the risk of damage to pipeline facilities by earthquakes to be low.

Even under much higher ground vibrations, the main risk to pipelines would be where the pipeline is buried along a hillside coupled with saturated unstable soils that could become displaced laterally during an earthquake. PennEast has identified areas to perform additional field work to assess this potential and it is discussed further in Section 4.1.5.2.

Secondary seismic effects triggered by strong ground-shaking are often more serious than the shaking itself. The most damaging secondary seismic effect is often soil liquefaction, a physical process in which saturated, non-cohesive soils temporarily lose their strength and liquefy (i.e., behave like a viscous liquid). Areas typically susceptible to liquefaction may include soils that are generally sandy or silty and are typically along rivers, streams, lakes, and shorelines, or in areas with shallow groundwater. Soil liquefaction can result in surface settlement in areas where the ground surface is flat, and soil flow or slope instability in areas where the landscape is sloped. PennEast performed a soil boring program to evaluate liquefaction at twelve random locations along the alignment and determined a low risk for liquefaction. Soil conditions necessary for liquefaction may occur at other locations along the alignment. However, due to the low potential for strong and prolonged ground-shaking associated with a seismic event, we find the potential for soil liquefaction to be low.

4.1.5.2 Landslides

Landslides involve the down-slope movement of earth materials under force of gravity due to natural or man-made causes. In Pennsylvania, portions of the Project would be susceptible to landslides. The Project location between MPs 5.3 and 15.2 in Luzerne County and between MPs 40.5 in Carbon County and MP 54.1 in Northampton County have a relatively high susceptibility to landslides with moderate incidence. The Project area between MP 20.9 in Luzerne County and MP 23.6 in Carbon County and between MPs 33.5 and 35 and MPs 38 and 40.5 in Carbon County have a moderate landslide incidence. The proposed Project facilities would be located in an area considered to have a low incidence of landslides for the New Jersey portion of the Project (USGS 2015). However, several locations in New Jersey have recorded landslides in close proximity to the pipeline. Figure 4.1.5-1 below identifies the areas that are crossed by the pipeline and define the incidence rates.

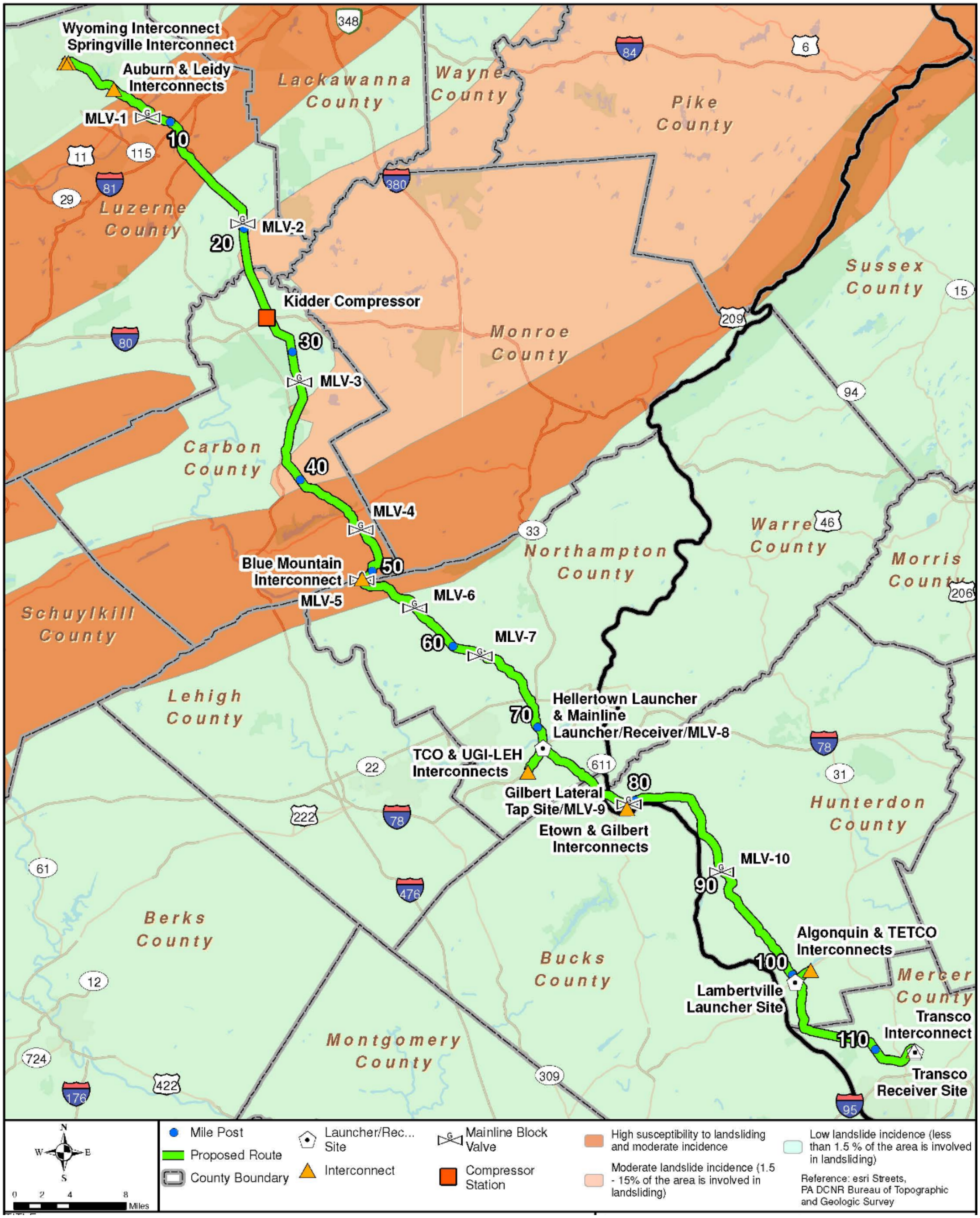

Figure 4.1.5-1 Landslide Potential Near the PennEast Pipeline Route

In Phase 1 of its Terrain Mapping and Geohazard Risk Evaluation Report PennEast identified the areas listed above as areas where it would conduct further field investigation and analysis. This further investigation and analysis has not yet been conducted. Therefore, **we recommend that:**

- **<u>Prior to construction</u>, PennEast should file with the Secretary results of the outstanding Phase 2 and 3 portions of the Geohazard Risk Evaluation Report and include the following in its pipeline design geotechnical report:**
  - **an evaluation of liquefaction hazards along the pipeline route and at the proposed compressor station site;**
  - **a final landslide hazard inventory;**
  - **any specific measures and locations where specialized pipeline design would be implemented to mitigate for potential liquefaction or landslide hazards; and**
  - **a post-construction monitoring plan.**

4.1.5.3 Flash Flooding

Flash flooding has the potential to occur in streams within the Project area, particularly in areas of higher relief and narrower stream valleys as happens periodically in Luzerne and Carbon counties. Flooding can be caused by significant storm events and seasonal variations in precipitation.

Construction of Project pipelines through 100-year floodplains would not result in the loss of floodplain storage as the pipelines would be installed below the ground surface and would not displace flow waters. No permanent aboveground facilities would be located within 100-year floodplains as reported by the Federal Emergency Management Agency.

Aboveground facilities located near floodplains and pipeline stream crossings would be designed to prevent potential impacts from high-velocity flows, largely by controlling erosion, in accordance with PennEast's E&SCP. The pipeline itself would be buried below scour depth and for larger stream crossings, HDD beneath the waterbody is proposed. Pipeline construction would also be subject to the PennEast E&SCP.

Through PennEast's implementation of measures to mitigate impacts in floodplains and at stream crossings outlined in its E&SCP, impacts on Project facilities from flash flooding are not expected.

4.1.5.4 Ground Subsidence

Subsidence is the local downward movement of surface material with little or no horizontal movement. Subsidence is a potential geologic hazard in areas where karst terrain occurs and where underground mining has taken place. In karst terrain, limestone and dolomite bedrock are dissolved by water and create karst features such as subsurface channels, caves, and sinkholes. USGS Mineral Resources On-Line Spatial Database (2005) was used to report the potential presence or absence of sinkholes in areas crossed by the Project. Table 4.1.5-1 presents the bedrock formations with sinkhole potential crossed by the Project.

TABLE 4.1.5-1 Bedrock Areas Subject to Sinkholes			
Station Name	County	Formation Name	Percent of Project Area
Pennsylvania Route	Northampton	Rickenbach	5%
Pennsylvania Route	Northampton	Epler	13%
Pennsylvania Route	Northampton	Allentown	22%
Pennsylvania Route	Northampton	Jacksonburg	6%
Pennsylvania Route	Northampton	Leithsville	7%
New Jersey Route	Hunterdon	Leithsville	<1%

PennEast conducted geophysical surveys to investigate karst conditions in those areas listed in table 4.1.5-1. The portions of the Project that cross potential karst areas include sections of the Project in Carbon, Northampton, and Bucks counties in Pennsylvania and Hunterdon County, New Jersey, totaling approximately 13.8 miles. The geologic formations underlying the Project with karst potential include the Rickenbach, Epler, Allentown, Jacksonburg, and Leithsville Formations. While the shale and slate of the Martinsburg Formation are not soluble, they are reported to develop closed depressions near the contact with the underlying Jacksonburg Formation (PADCNR 2015a), possibly reflecting karst-related subsidence.

PennEast continues to update the Project-specific Karst Mitigation Plan to include current information regarding on-going field surveys, geophysical surveys, and geotechnical borings conducted to support identification and mapping of karst features along the proposed pipeline alignment. The current Karst Mitigation Plan is a comprehensive, stand-alone document that identifies both the desktop review and field investigations completed to map known or suspected karst areas, and provides guidance to mitigating karst-related concerns during construction.

Geologic and karst terrain mapping depicting each identified karst feature, location of surveys and borings, and location of potential closed depressions related to karst has been included in the Karst Mitigation Plan. PennEast continues to complete additional geophysical investigations as landowner permissions become available to categorize and rank other suspected karst locations. Once completed, these surveys in addition to geotechnical borings, would help determine the extent of karst features and if they occur beneath the proposed pipeline alignment. Because these additional surveys are not yet complete, **we recommend that:**

- **<u>Prior to construction</u>, PennEast should file with the Secretary a final Karst Mitigation Plan that incorporates the results of all outstanding geophysical and geotechnical field investigations in karst areas including stream crossings proposed with the HDD method.**

The presence of caves in karst environments is not uncommon. Based on New Jersey and Pennsylvania Geological Survey data, there are no caves within 0.25 mile of the PennEast pipeline or laterals.

In the Wyoming Valley of Luzerne County, Pennsylvania, there are a number mapped underground mines and there is potential that many more small mines exist that are unmapped and unknown, as they predate accurate records kept on the subject. Old abandoned mines are expected to be of the room and pillar type. Based on the long and extensive history of underground coal mining in the Wyoming Valley area, localized surface subsidence caused by mine collapse is a potential hazard.

PennEast met with the Pennsylvania Bureau of Abandoned Mine Reclamation, which administers and oversees the Abandoned Mine Reclamation Program in Pennsylvania. Maps of mines in the Project area were obtained and have been incorporated into the siting and engineering design processes. In addition, PennEast is coordinating with the Pennsylvania Bureau of Abandoned Mine Reclamation to examine the area where the pipeline would cross the Susquehanna River. Where the available information indicates that working mines are likely to exist below the Project alignment, borings would be drilled for confirmation and to determine the length of the pipeline section that would be affected. PennEast would implement mitigation measures, as needed, to minimize the risk of subsidence due to underground mines after performing these borings and geotechnical analysis. Because this analysis is ongoing, **we recommend that:**

- **<u>Prior to the end of the draft EIS comment period</u>, PennEast should file with the Secretary the results of its ongoing evaluation of potential presence of working and abandoned mines near the proposed crossing of the Susquehanna River. The evaluation should include documentation of coordination with the Pennsylvania Bureau of Abandoned Mine Reclamation, and should identify any specific design or mitigation measures.**

Maximum unsupported span length calculations for a 36-inch-diameter pipeline show that a maximum span length of about 58 feet (Class 2 pipe) and 63 feet (Class 3 pipe) would be acceptable. The largest anomaly detected by geophysical and geotechnical work completed by PennEast to-date has been about 30 feet. The Karst Mitigation Plan presents methods for evaluating and crossing larger spans. In areas of karst, PennEast would conduct regular inspections, and if evidence of subsidence is noticed, corrective actions would be implemented as needed.

4.1.5.5 Arsenic

Naturally occurring arsenic is present in trace amounts in the rocks of the Newark Basin of southeastern Pennsylvania and New Jersey, specifically in the Lockatong and Passaic Formations. The mineral pyrite has been identified as the primary source of the arsenic; however, hematite and clay minerals are also major sources. Arsenic occurs in some groundwater aquifers due to natural chemical oxidation of pyrite or reduction of iron oxide minerals in the aquifer (NJDEP 2010). In order to protect public health the USEPA has established a drinking water standard or maximum contaminant level (MCL) of 10 parts per billion (ppb) for public water supplies. The NJDEP MCL has been established at 5 ppb, for arsenic.

In the New Jersey municipalities along the proposed pipeline route, the highest percent of total well samples that exceed the NJ MCL were located in Frenchtown Borough (70 percent of wells sampled exceeded the NJ MCL), Kingwood Township (42.6 percent of wells sampled exceeded the NJ MCL) and Hopewell Township (26.7 percent of wells sampled exceeded the NJ MCL). In Hunterdon County, a maximum concentration of 144 micrograms per liter (µg/l) arsenic was found in a well and Mercer County, and a maximum concentration of 254 µg/l arsenic was identified.

This data also indicates that shallow groundwater in the Passaic and Lockatong Formations generally have low arsenic concentrations and that high arsenic concentrations in water supply wells are the result of more mature groundwater interacting with geochemically susceptible and arsenic-enriched water bearing zones, which are often deeper wells.

The potential for surface activities to mobilize arsenic that could reach deep water wells is uncertain. The NJDEP has no indication that common construction activities that involve shallow excavation, such as home construction, has resulted in increased arsenic concentrations in water-supply wells. Consequently, the likelihood that the pipeline construction and operation would cause widespread increases in arsenic concentrations in groundwater supplies is not supported by any empirical data.

In order to evaluate concerns that commenters expressed related to the potential arsenic mobilization of naturally occurring arsenic in Hunterdon and Mercer Counties, New Jersey, PennEast initiated a study (Serfes 2016) that resulted in a comprehensive, independent leachability evaluation of representative rock samples collected along the proposed pipeline route from both the surface and from geotechnical borings. The purpose of the study was to evaluate concerns of mobilizing arsenic from trench backfill consisting of enriched arsenic bearing rock fragments generated during pipeline trenching activities; and to evaluate concerns of mobilizing arsenic from similar arsenic-enriched rock during HDD activities. The study applied the industry-standard test method (USEPA Method 1627: Kinetic Test Method for the Prediction of Mine Drainage Quality) and a modified standard test method (USEPA Test Method 1311 – TCLP, Toxicity Characteristic Leaching Procedure).

The results of the study demonstrated that broken fragments of naturally occurring arsenic enriched rock, generated during trenching activities and subsequently returned as trench back fill, would not result in no detectible risk of arsenic mobilization; and drilling mud, used for HDD, would not become contaminated with particles of naturally occurring arsenic enriched rock, and that the arsenic and that enriched rock-mud mixture would not require handling and disposal as a hazardous waste class. Therefore, there should be no detectible risks from arsenic mobilization in groundwater due to Project construction. The study demonstrates that background concentrations would return within a short time after the pipeline is completed and no mobilization would continue during operation.

In order to be proactive and precautionary to the public concern, PennEast has prepared a well testing plan and proposes to conduct groundwater quality testing of potentially affected wells prior to construction. This testing would provide a baseline of arsenic concentrations in wells adjacent to construction work areas.

PennEast would likewise conduct post-construction water quality testing for arsenic in groundwater wells adjacent to the construction work areas, to identify if arsenic concentrations have increased above pre-construction (background) concentrations. In the unlikely event that construction of the Project causes an increase in arsenic above safe drinking water levels, PennEast would provide a treatment system to remove arsenic from the drinking water at individual properties or, provide an alternative water source.

4.1.6 Rock Removal and Blasting

PennEast anticipates that some rock removal would be required as a result of trench excavation in areas of shallow bedrock. Areas of shallow bedrock would be crossed in Luzerne (25 percent of route), Carbon (28 percent of route), and Northampton (35 percent of route) counties, Pennsylvania, and Hunterdon (69 percent of route) and Mercer (23 percent of route) counties, New Jersey. The locations by milepost for areas that could require blasting due to shallow bedrock are presented in Appendix G-3.

Rock encountered during excavation of the pipeline trench would be removed using one of these available rock removal techniques:

- conventional excavation with a backhoe;
- ripping with a bulldozer followed by backhoe excavation;
- pneumatic hammering followed by backhoe excavation;
- blasting surface rock followed by backhoe excavation; or
- blasting subsurface (if necessary) rock prior to backhoe excavation.

The rock removal technique selected would be dependent on relative hardness, fracture susceptibility, expected volume, and the specifics of the location.

If blasting is required, all blasting activity would be performed according to federal and state safety standards and in accordance with PennEast's comprehensive Blasting Plan to be implemented by a certified blasting contractor. PennEast would make every attempt to utilize non-blasting bedrock removal techniques. If blasting must occur to remove bedrock, timing restrictions would be put into effect and may include blasting prohibition during breeding season(s) and/or other restrictions as detailed in the Blasting Plan, which includes pre- and post-blast surveys. Excess rock generated during the construction of the Project would be hauled to an approved quarry near the pipeline route and disposed. The Blasting Plan provides specific procedures, safety measures, notification processes, and other required protocols that would be employed during any blasting activities. PennEast would notify surrounding landowners in advance of any potential blasting.

4.1.7 Geotechnical Investigations for the Proposed HDDs

PennEast proposes to use the HDD pipeline installation method at 11 locations to cross roads, waterbodies, and a railroad as shown in table 4.1.7-1. PennEast has completed desktop analysis of geologic conditions at each of the proposed HDD crossings, and would complete field investigations prior to final pipeline design. The purpose of the geotechnical investigations is to understand if the existing condition would be suitable to use the HDD method and to help design each HDD crossing. Some field analysis is incomplete due to lack of permission to access the right-of-way to install borings, changes in the proposed alignment and design, and variation in geologic materials encountered requiring modifications in the drilling program.

TABLE 4.1.7-1 Status of Geotechnical Investigations for HDD Locations			
MP	Crossing Identification	County	Field/Final Analysis Status
10.4-10.7	US Hwy 81 / St. Hwy 315	Luzerne	Not Started
43.2-44.4	Wild Creek/Pohopoco Stream	Carbon	Partially Complete
69.9-70.5	St. Lukes (Lowes)	Northhampton	Partially Complete
70.6-71.4	Lehigh River	Northhampton	Complete
71.6-72.1	Interstate 78	Northhampton	Partially Complete
77.4-77.9	Delaware River and Canal	Northhampton	Partially Complete
91.4-92.6	Lockatong Creek	Hunterdon	Not Started
99.7-100.9	Alexauken Creek	Hunterdon	Not Started
105.4-106.0	Pleasant Valley Road	Mercer	Partially Complete
110.4-110.9	Washington Crossing Pennington Road	Mercer	Not Started
111.4-111.9	CSXT Railroad	Mercer	Partially Complete

PennEast has developed a HDD Drilling Plan for Karst Terrain because several of the HDD crossings would be performed in carbonate rock. This plan is included as part of the Karst Mitigation Plan. We have recommended above that PennEast should file with the Secretary a final Karst Mitigation Plan that includes results of all outstanding geophysical and geotechnical field investigations. Additionally **we recommend that:**

- **<u>Prior to construction</u>, PennEast should file with the Secretary the results of all outstanding geotechnical investigations and final planned design of each HDD crossing.**

4.1.8 Paleontological Resources

Paleontological resources (vertebrate and invertebrate fossils) are sometimes discovered at locations under excavation or in areas exposed by erosion. Direct effects to paleontological resources could occur during Project construction by activities such as grading or trenching. Indirect effects to fossil beds could result from erosion caused by earth disturbance, vegetation clearing, and/or unauthorized collection.

The bedrock units crossed by the Project that are either metamorphic or igneous in origin do not contain fossils. There are no significant fossil sites within the Project area in Pennsylvania (Daeschler 2015, Gishlick 2015). Two potential fossil sites are located in Hunterdon County, New Jersey. The old Smith-Clark Quarry is located in Milford, New Jersey, approximately 0.62 mile from the Project. The second location includes the banks and streambed of Nishisakawick Creek in Frenchtown, New Jersey, which is approximately 0.85 mile east of the Project (Gallagher 2015).

Based on the lack of fossil sites in the Project area, the distance to any known fossil locality, and depth to fossiliferous beds within the bedrock below pipeline installation depth, no impact on paleontological resources is expected.

4.2 SOILS

4.2.1 Existing Soil Resources

The descriptions and characteristics of soils discussed in this section were compiled from a variety of data sources including soil surveys and website databases published and maintained by the NRCS. The soil associations and soil series and map unit descriptions were compiled from information in the USDA Soil Conservation Service Soil Surveys for Luzerne, Carbon, Northampton, and Bucks counties, Pennsylvania; Hunterdon and Mercer counties, New Jersey; and USDA NRCS Web Soil Surveys for Luzerne, Carbon, Northampton, and Bucks counties, Pennsylvania and Hunterdon and Mercer counties, New Jersey.

The NRCS digital Soil Survey Geographic Database (SSURGO) for these counties includes geospatially referenced Geographic Information System (GIS) soil map unit polygons at a scale of 1:24,000. SSURGO data contain the most detailed level of soil mapping performed by the NRCS, and corresponds with or supersedes the original county soil survey mapping (USDA 2010).

The soils in the vicinity of the proposed Project were developed and eroded through a variety of transport, weathering, and biologic processes, including glacial actions, riverine transport, mass wasting, and in situ chemical weathering. In addition, anthropogenic processes relating to farming, road and building construction, or other leveling and filling operations affect the soil distribution in some manner.

4.2.1.1 Pipeline Facilities

Soils crossed by the proposed PennEast Pipeline and laterals were evaluated to identify prime farmland and major soil characteristics that could affect construction or increase the potential for construction-related soil impacts. The soil characteristics evaluated were erosion potential, prime farmland, hydric soils, compaction-prone soils, shallow bedrock, and soils with poor revegetation potential. Additional soil-related impacts due to construction or operation include disruption of agricultural drainage or irrigation systems. Table 4.2.1-1 provides a summary of the significant soil characteristics that would be crossed by the proposed pipeline facilities by permanent and temporary acreage. Individual soil characteristics and the proposed mitigation measures that would be implemented by PennEast are discussed in the sections below.

Erosion by Water and Wind

Erosion is a continuing natural process that can be accelerated by human disturbance. Factors such as soil texture, structure, slope, vegetative cover, rainfall intensity, and wind intensity can influence the degree of erosion. Soils most susceptible to erosion by water are typified by bare or sparse vegetative cover, non-cohesive soil particles with low infiltration rates, and moderate to steep slopes. Soils typically more resistant to erosion by water include those in low relief areas, are well-vegetated, and have high infiltration capacity and internal permeability.

About 406 acres (38 percent) of the soils along the proposed pipeline segments are considered highly erodible by either water or wind and would be temporarily impacted.

TABLE 4.2.1-1

Temporary and Permanent Acreage Impacts of Soil Limitations for all Project Components

Pipeline Facility	Prime Farmlands (Includes Farmlands of Statewide Importance)		Compaction Potential a/		Water Erosion Potential b/		Wind Erosion Potential c/		Revegetation Potential d/		Hydric Soils e/		Poor Drainage Potential f/	
	Temp Impacts (ac)	Perm Impacts (ac)	Temp Impacts (ac)	Perm Impacts (ac)	Temp Impacts (ac)	Perm Impacts (ac)	Temp Impacts (ac)	Perm Impacts (ac)	Temp Impacts (ac)	Perm Impacts (ac)	Temp Impacts (ac)	Perm Impacts (ac)	Temp Impacts (ac)	Perm Impacts (ac)
Pipeline (Includes ATWS)	528.8	-	51.8	-	404.7	-	1.1	-	723.0	-	28.6	-	148.6	-
Aboveground Facilities	1.7	22.1	0	0.1	2.0	11.4	0.0	0.0	4.3	53.3	0.0	0.0	0.9	26.5
Access Roads	40.6	0.0	4.6	0.0	45.1	0.0	0.4	0.0	90.4	0.0	3.2	0.0	11.1	0.0
Pipeyards	197.0	0.0	11.3	0.0	49.4	0.0	0.0	0.0	214.6	0.0	0.0	0.0	40.7	0.0
Ware Yards	12.2	0.0	0.0	0.0	2.5	0.0	0.0	0.0	18.5	0.0	0.0	0.0	0.0	0.0
TOTAL	**780.3**	**22.1**	**67.7**	**0.1**	**503.7**	**11.4**	**1.5**	**0**	**1050.8**	**53.0**	**31.8**	**0.0**	**201.3**	**26.5**

Notes:
a/ Includes acreage of soils with High Compaction Potential
b/ Includes acreage of soils with Severe and Very Severe Water Erosion Potential
c/ Includes acreage of soils within Wind Erodibility Groups 1 or 2 - High Wind Erosion Potential
d/ Includes acreage of soils with Poor Revegetation Potential
e/ Includes acreage of soils with All Hydric (Hydric) Soils
f/ Includes acreage of soils with Poorly Drained, Somewhat Poorly Drained, and Very Poorly Drained Drainage Potential
Note: An area may be included under more than one limitation.

Wind erosion processes are less affected by slope angles than water processes. Wind-induced erosion often occurs on dry soil where vegetative cover is sparse and strong winds are prevalent. Wind erodibility was assessed based on the NRCS wind erodibility group (WEG) designations. A WEG is a grouping of soils that have similar surface layer properties that affect their resistance to soil blowing and are designated on a scale of WEG1 to WEG8 (WEG1 being the most susceptible). These properties include texture, organic matter content, and aggregate stability. Soils in WEG1 and WEG2 include sandy-textured soils with poor aggregation, which are particularly susceptible to wind erosion. None of the soils on the proposed pipeline route were part of these groups.

Prime Farmland Soils

The USDA defines prime farmland as "land that is best suited to food, feed, fiber, and oilseed crops." This designation includes cultivated land, pasture, woodland, or other lands that are either used for food or fiber crops or are available for these uses. The fact that a particular soil is considered prime farmland does not mean that it is currently in agricultural use; some prime farmland soils may be located in forested, open, or residential areas. Urbanized land and open water are excluded from prime farmland. Prime farmland typically contains few or no rocks, is permeable to water and air, is not excessively erodible or saturated with water for long periods, and is not subject to frequent, prolonged flooding during the growing season. Soils that do not meet the above criteria may be considered prime farmland if the limiting factor is mitigated (e.g., artificial drainage). Farmland of statewide importance is farmland for production of food, feed, fiber, forage, and oilseed crops, determined by the appropriate State agency or agencies. Generally, additional farmlands of statewide importance include those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Additional farmlands of statewide importance may include tracts of land that have been designated for agriculture by State law. The numbers presented in table 4.2.1-1 include farmland of statewide importance.

About 529 acres (49.5 percent) of the soils along the proposed pipeline including ATWS are considered prime farmland and would be temporarily impacted by construction.

Hydric Soils

Hydric soils are defined as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. Soils that are artificially drained or protected from flooding (e.g., by levees) are still considered hydric if the soil in its undisturbed state would meet the definition of a hydric soil. Generally, hydric soils are those soils that are poorly and very poorly drained. Hydric soils may indicate the presence of wetlands. In addition, high groundwater levels associated with hydric soils could create a buoyancy hazard for buried pipelines.

About 29 acres (2 percent) of the soils crossed by the proposed pipeline segments are considered hydric soils and would be temporarily impacted by construction.

Compaction Potential

Soil compaction modifies the structure and reduces the porosity and moisture-holding capacity of soils. Construction equipment traveling over wet soils could disrupt the soil structure, reduce pore space, increase runoff potential, or cause rutting. The degree of compaction depends on moisture content and soil texture. Fine-textured soils with poor internal drainage that are moist or saturated during construction are most susceptible to compaction and rutting.

Many soils along the proposed pipeline segments have likely already been compacted due to past development and some areas being covered by paved surfaces. The degree of compaction was evaluated based on the drainage class of the soils. Very poorly and poorly drained soils were considered to have a high potential for compaction. Somewhat poorly to moderately well-drained soils were considered to have a moderate potential for soil compaction. Well-drained to excessively drained soils were considered to have a low potential for soil compaction.

Soils with a high potential for compaction and structural damage in the Project area are typically very poorly drained soils located in wetlands with an organic soil component.

About 52 acres (4.8 percent) of the soils along the proposed pipeline segments are soils with a high compaction potential and would be temporarily impacted by construction.

Revegetation Potential

The ability of soils crossed by the PennEast Pipeline and laterals to support successful revegetation was determined by NRCS official series descriptions and county soil surveys. The drainage class, slope class, and erosion potential of each soil type crossed was evaluated to determine revegetation potential. Other considerations included whether or not the mapped soils were natural, human transported, or disturbed.

Droughty soils that have coarse-textured surface layers and are moderately well to excessively drained may prove difficult to revegetate. These drier soils have less water to aid in the germination and eventual establishment of new vegetation. The coarser textured soils also have a lower water holding capacity following precipitation, which could result in moisture deficiencies in the root zone creating unfavorable conditions for many plants.

About 723 acres (67 percent) of the soils along the proposed PennEast Pipeline and laterals are soils with a poor revegetation potential and would be temporarily impacted by construction.

Shallow Bedrock

Excavation of the pipeline trench in areas of shallow bedrock could result in the incorporation of bedrock fragments into surface soils, therefore we quantified areas of shallow bedrock crossed by the PennEast Pipeline and laterals. Introducing stones and other rock fragments to surface soil layers could reduce soil moisture-holding capacity, resulting in a reduction of soil productivity. Additionally, some agricultural equipment could be damaged by contact with large rocks and stones.

The potential for introducing rock into the topsoil was evaluated based on bedrock depth. USDA data were used to identify soil map units where depth to bedrock is generally anticipated to be less than 5 feet (60 inches) from the soil surface (USDA 2010).

About 35.6 miles (31 percent) of soils crossed by the proposed PennEast Pipeline and laterals have shallow depth to bedrock.

4.2.1.2 Aboveground Facilities

The Kidder Compressor Station is proposed at approximately MP 26.6 in Kidder Township, Carbon County. The site of the compressor station is an approximately 56.6-acre tract and would have a permanent footprint of 34 acres. All the soils at the compressor station are somewhat poorly drained with a moderate potential for erosion and a poor revegetation potential.

In all the above ground facilities would permanently impact approximately 22 acres (36 percent) of prime farmland, 26 acres 42 percent) that are poorly drained and 53 acres 87 percent) with poor revegetation potential. Current water erosion potential is high at 11.4 acres (18 percent) of the above ground facilities.

4.2.1.3 Pipeyards and Contractor Ware Yards

PennEast has identified 14 pipeyards that would be used during construction. These yards would temporarily affect about 372 acres of land, which is a mix of agricultural, woodland, residential, and industrial/commercial land. If necessary, rough grading and vegetation clearing of temporary construction yards would be conducted. However, proposed modifications to these areas is yet to be determined.

At the pipeyard locations approximately 197 acres (52 percent) of prime farmland would be temporarily impacted. Fifty acres (13 percent) currently have a high erosion potential and 214 acres (57 percent) have a poor revegetation potential. Forty one acres (10 percent) are poorly drained.

4.2.1.4 Access Roads

PennEast proposes to utilize existing public and private roads when possible. Improvements to these roads could include tree branch clearing, gravel placement, minor grading, and/or widening. Temporary access roads used for construction would be restored in accordance with landowner agreements. Landowner permission would be obtained for all proposed new permanent access roads.

At the access road locations approximately 41 acres (37 percent) of prime farmland would be temporarily impacted. Forty-five acres (40 percent) currently have a high erosion potential and 90 acres (81 percent) have a poor revegetation potential. Eleven acres 10 percent) are poorly drained.

4.2.1.5 Contaminated Soils

PennEast conducted a corridor database search using Environmental Data Resources, Inc. (EDR) to identify various facilities with potential and/or actual sources of contamination that could impact nearby soils along the proposed pipeline and aboveground facilities. A list of databases searched is included in table 4.2.1-2.

Six sites were reported by the EDR report and seven sites reported by NJDEP that would be within the Project workspace. Encor Coatings, Inc., located in Bath, Pennsylvania, has undergone Emergency Planning and Community Right-to-Know Act Section 325 enforcement actions. This site would be within the construction workspace at MP 62.7. There was no noted enforcement actions at the other identified sites.

TABLE 4.2.1-2

Sites with Potential Soil/Groundwater Contamination in the Vicinity of the PennEast Pipeline

Site Name	Nearest Milepost	Site Address	Database	Distance from Project Workspace (feet)	Direction from Workspace to Site
Pennsylvania					
PPL Martins Creek LLC/Jenkins CTG	8.9	Market St, Village of Laflin, Laflin PA	PA EFacts	110	Northeast
WWTP-PA American Water Co.	11.7	Jumper Rd., Wilkes Barre, PA, 18702	PA AST	73.1	West
Skrapits Concrete Moore Township	60.6	80 Moorestown Rd., Bath, PA 18014	PALUST	100	North
Encor Coatings Inc.	62.7	Route 248, Bath, PA	ICIS, NCDB	Within Workspace	Within Workspace
Everson Tesla Inc.	64.3	615 Daniels Rd., Nazareth, PA 18064	RCRA-SQG	100	North
Columbia Gas Trans Hellertown LLC	Hellertown Lateral 2.1	2425 Easton Rd, Hellertown, PA 18055	FINDS, RCRA-SQG	Within Workspace	Within Workspace
New Jersey					
Corrugated Paper Group Inc.	77.8	623 Rieglesville Rd, Holland Twp., NJ	RCRA-SQG, NY Manifest	160	South
Sithe NJ Holdings/ Reliant Energy Gilbert Power Plant	Gilbert Lateral 0.4	315 Riegelsville Rd., Milford NJ	CORRACTS, RCRA-TSDF	385	West
United Reform Church	89.4	97 Horseshoe Bend Rd, Frenchtown, NJ 08825	RCRA-LQG, NJEMS	25	East
Texas Eastern Transmission LP	Lambertville Lateral 1.4	1325 Route 179 & RT 29, Lambertville, NJ	RCRA-LQG, PADS	Within Workspace	Within Workspace
Hopewell Township DOP	110.7	203 Washington Crossing, Hopewell NJ	NJLUST, NJ HIST HWS, NJ HIST LF	Within Workspace	Within Workspace
Pennington Family Chiropractic	112.6	2554 Pennington Rd, Pennington, NJ	NJ-NJEMS	100	Northwest
Transcontinental Gas Pipeline Pennington M&R	112.7	Blackwell Road, Hopewell, NJ	KCSNJ, NJEMS	40	West

Key:
CERCLIS: The Comprehensive Environmental Response, Compensation and Liability Information System contains data on potentially hazardous waste sites that have been reported to the EPA by states, municipalities, private companies, and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to be included or currently on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

CERC-NFRAP: Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps would be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time

CORRACTS: CORRACTS is a list of handlers with RCRA Corrective Action Activity. This report shows which nationally-defined corrective action core events have occurred for every handler that has had corrective action activity

FINDS: The Facility Index System contains both facility information and "pointers" to other sources of information that contain more detail. These include: RCRIS; Permit Compliance System (PCS); Aerometric Information Retrieval System (AIRS); FATES (FIFRA [Federal Insecticide Fungicide Rodenticide Act] and TSCA Enforcement System, FTTS [FIFRA/TSCA Tracking System]; CERCLIS; DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes); Federal Underground Injection Control (FURS); Federal Reporting Data System (FRDS); Surface Impoundments (SIA); TSCA Chemicals in Commerce Information System (CICS); PADS; RCRA-J (medical waste transporters/disposers); TRIS; and TSCA. The source of this database is the U.S. EPA/NTIS.

TABLE 4.2.1-2 Sites with Potential Soil/Groundwater Contamination in the Vicinity of the PennEast Pipeline
ICIS: The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.
KCSNJ: The Known Contaminated Sites in NJ report is produced by NJDEP in response to N.J.S.A. 58:10-23.16-17 that requires preparation of a list of sites affected by hazardous substances. It also satisfies the Site Remediation Program's obligations under the NJ New Residential Construction Off-Site Conditions Disclosure Act (N.J.S.A 46:3C1 et seq.).
PALUST/NJLUST: A listing of regulated Underground Storage Tanks that have reported leaking and a cleanup is underway.
NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act).
NPL: Also known as Superfund, the National Priority List database is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund program. The source of this database is the U.S. EPA.
NJ BROWNFIELDS: Brownfields are identified as former or current commercial or industrial use sites that are presently vacant or underutilized, on which there is suspected to have been a discharge of a contamination to the soil or groundwater at concentrations greater than applicable cleanup criteria.
NJEMS: NJEMS Sites are points representing sites regulated by NJDEP under one or more regulatory permitting or enforcement programs, or sites that are otherwise of some interest to a NJDEP program. Program interests included in NJEMS are Air, Communications Center, Discharge Prevention, Exams and Licensing, Fish Game and Wildlife, Green Acres, Hazardous Waste, Lab Certification, Land Use, Landscape Irrigation, Parks and Forestry, Pesticides, Pinelands, Planning, Radiation, Right-to-Know, Site Remediation, Soil Conservation, Solid Waste, TCPA, Water Quality, Water Supply, and Watershed Management.
NJ HIST LF: Old or non-permitted solid waste facilities/landfills that are not included in the current solid waste facilities/landfills database.
NJ HIST HWS: The Known Contaminated Sites in NJ report is a municipal listing of sites where contamination of soil and/or ground water is confirmed at levels greater than the applicable cleanup criteria or standards. Remedial activities are underway or required at the sites with an on-site source(s) of contamination and at locations where the source(s) of contamination is unknown. Sites with completed remedial work that require engineering and/or institutional controls have reporting measures in place to ensure the effectiveness of past actions, and some include maintenance and/or monitoring
NY Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.
PADS: The PCB Activity Database identifies generators, transporters, commercial storers and/or brokers and disposers of polychlorinated biphenyls (PCBs) who are required to notify the United States Environmental Protection Agency of such activities. The source of this database is the U.S. EPA
PA EFACTS: The Department’s eFACTS (Environment, Facility, Application, Compliance Tracking System) database (formerly known as the Foundation for Information eXchange (FIX)) is a Department-wide database that provides a holistic view of the clients and sites (including facilities) that DEP regulates.
PALRCL: PA Land Recycling Cleanup Locations. The goals of the Land Recycling Program are to encourage public sector cleanup of contaminated, vacant, or otherwise underutilized properties and return them to productive use.
PA UNREG LTANKS: Leaking storage tank cases from unregulated storage tanks.
RCRA-LQG: RCRAInfo is EPA’s comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites, which generate, transport, store, treat, and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.
RCRA-SQG: RCRAInfo is EPA’s comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites, which generate, transport, store, treat, and/or dispose of hazardous waste as defined by the RCRA. Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.
TSCA: The Toxic Substances Control Act identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site. The United States Environmental Protection Agency has no current plan to update and/or re-issue this database.

Hopewell Township Department of Public Works was recorded as having a historic compost facility along with several storage tanks containing diesel fuel and gasoline, which have since been removed in 1990. The Columbia Gas Transmission Hellertown, LLC site was recorded as producing less than 1,000 kilograms/month of hazardous waste, including miscellaneous polychlorinated biphenyls (PCB) wastes. No hazardous waste spills have been recorded. Texas Eastern Transmission LP was recorded as producing less than 1,000 kilograms/month of hazardous waste, including miscellaneous PCB wastes. No major earth disturbance activities associated with the Project would be conducted in areas known for PCB contamination.

No listed release sites were identified that would impact soils at the compressor station.

4.2.2 General Impacts and Mitigation

Pipeline construction activities along the right-of-way, such as clearing, grading, trench excavation, backfilling, and the movement of construction equipment may affect soil resources. Clearing removes protective vegetative cover and exposes the soil to the effects of wind and rain, which increases the potential for soil erosion and sedimentation of sensitive areas. Grading, spoil storage, and equipment traffic may compact soil, reducing porosity and increasing runoff potential. Excess rock or fill material brought to the surface during trenching operations could reduce the revegetation potential of surface soils and hinder the restoration of the right-of-way.

About 44.5 miles (27.0 miles in Pennsylvania and 17.5 miles in New Jersey), or about 39 percent of the 115.0-mile-long pipeline route, would be constructed adjacent to existing rights-of-way (see section 2.2.1). Locating the new pipeline adjacent to existing rights-of-way would limit new soil disturbance by allowing a portion of the construction workspace to overlap previously developed or disturbed soils and minimize land use change. To further reduce the impacts of construction on soils, PennEast would implement its E&SCP, which incorporates all of the applicable mitigation measures outlined in the FERC Plan and the majority of the measures outlined in the FERC Procedures. The E&SCP has been designed for use by PennEast and its contractors as a guidance manual for minimizing soil disturbance and transportation of sediments off the right-of-way or into sensitive resources (wetlands, streams, and residential areas) during pipeline construction. The procedures presented in PennEast's E&SCP represent BMPs and are designed to accommodate varying field conditions while maintaining strict minimum standards for the protection of soil resources and environmentally sensitive areas. We have reviewed the E&SCP and find it acceptable. The E&SCPs would also be approved by the County Conservation Districts in the counties impacted by the Project in Pennsylvania prior to construction. In New Jersey, each county impacted by the Project would review the E&SCP as part of review of the Erosion and Sediment Control General Permit (ESCGP-2) or E&SCP Certification.

The FERC Plan and Procedures as well as PennEast's E&SCP would be followed in upland areas, wetland areas, and waterbody crossings and includes measures to protect soils in those areas. The Plan and Procedures are designed to control erosion and sedimentation during construction and provide for soil stabilization and revegetation of the construction right-of-way during restoration.

4.2.2.1 Soil Erosion

PennEast would implement the measures specified in its E&SCP to avoid or minimize potential impacts due to soil erosion and sedimentation. As outlined in the E&SCP, PennEast would have an EI monitoring all phases of construction to ensure Project plans are followed and would use erosion control devices and construction practices that would minimize erosion during and after construction. Wetland and waterbody crossings would be designed to minimize erosion. At the end of construction, PennEast would return surface contours and drainage patterns to as close to original conditions as practicable and reestablish vegetation as soon as possible following final grading. PennEast would inspect the right-of-way and maintain erosion and sediment controls as necessary until final stabilization is achieved. Once revegetation is satisfactory, temporary erosion control measures would be removed. We find that soil erosion would be minimized through proper implementation and maintenance of measures in the FERC Plan and E&SCP.

4.2.2.2 Farmland Soils and Drain Tiles

Pipeline construction activities such as clearing, grading, and equipment movement can result in soil compaction and an increased susceptibility to erosion. The loss of topsoil due to erosion or the mixing of topsoil with the subsoil during construction could result in a loss of soil fertility and impair revegetation.

Drain tiles are subsurface structures used in agricultural areas to improve the productivity of the land by increasing drainage of the soils. Drain tile damage can occur with rutting due to operation of heavy construction equipment in wet soils and excavation of the pipeline trench.

PennEast would implement the following measures for maintaining soil fertility in active agricultural lands, including active agricultural lands classified as prime farmland and farmlands of state importance, temporarily affected by construction activities:

- segregating up to 12 inches of topsoil from the entire construction right-of-way in order to maintain surface horizons with higher organic matter content;
- backfilling rock fragments (bedrock or naturally occurring in the overlying soils to only the top of the natural bedrock profile. Excess rock fragments would be disposed of in an approved manner and would not interfere with agricultural activities;
- testing topsoil and subsoil for compaction at regular intervals. Severely compacted topsoil would be plowed or a green manure such as alfalfa would be planted and plowed to decrease bulk density and improve soil structure; and
- where drain tiles are crossed, maintaining flow to the drainage system during construction. During restoration drain tile systems would be probed beyond the trenchline to determine if any damage occurred beyond the Project work area. Any damage to or temporary manipulation of a drain tile system would be repaired to a level of function that meets the original condition.

Post construction monitoring would consist of follow-up inspections of all disturbed areas, as necessary to determine the success of revegetation, address landowner concerns, and make any needed repairs. At a minimum, inspections would be conducted after the first and second growing seasons. Restoration would be considered successful if the right-of-way surface condition is similar to adjacent undisturbed lands, construction debris is removed (unless otherwise approved by the land owner or land managing agency), revegetation is successful, and proper drainage has been restored.

We conclude that with the implementation of these mitigation measures in accordance with the FERC Plan and PennEast's E&SCP, impacts on active farmland classified as prime farmland, and farmlands of state importance and drain tiles would not be significant and would be temporary.

4.2.2.3 Hydric Soils and Compaction Potential

Very poorly and poorly drained soils are prone to compaction and structural damage if disturbed due to permanent or frequent saturation at or near the soil surface. PennEast's E&SCP provides detailed descriptions of wetland and waterbody crossing techniques designed to minimize damage to saturated soils, as well as other soils that could be vulnerable to such damage when wet.

To the extent practicable, PennEast would avoid construction during periods of heavy rainfall, snowmelt, or unusual soil saturation. Topsoil would be segregated in wetlands and residential areas and then later returned as the surficial layer. Timber mats and low ground pressure machinery would be used to minimize rutting and compaction within saturated wetland soils. Grading in wetlands would be limited to that needed to restore natural site contours and repair rutted areas before final revegetation and seeding, which would initiate natural restoration of soil structure and bulk density. Given these measures, the Project activities would not result in significant adverse soil structural damage or compaction. Any impacts on soil structure would be temporary. See additional discussion of construction and operation impacts and mitigation measures specific to wetlands in section 4.4 of this EIS.

4.2.2.4 Post-construction Revegetation

Soils disturbed by the Project in uplands would be revegetated using a seed mix composed primarily of grasses, herbaceous plants, and legumes or as specified by landowners. PennEast would also segregate topsoil, if any, from either the full work area in agricultural areas or from the trench line and subsoil storage area (ditch plus spoil side method) to optimize revegetation potential. The E&SCP guidelines and requirements were developed based on the guidelines and recommendations from the FERC, USACE, FWS, County Conservation Districts, and the NJDEP.

Soils in the Project area should allow for successful revegetation, and where limitations exist, they would easily be overcome by implementing construction and BMP procedures. Standard revegetation measures include use of fertilizer and pH amendments (except in wetlands), seedbed preparation, use of a proven seed mix, consideration of seasonal constraints, and mulch application of disturbed areas except for cultivated croplands. Where necessary, biodegradable erosion control fabric or matting would be used on steep slopes to help ensure that soils successfully revegetate. PennEast would monitor all areas disturbed by Project construction for two growing seasons after construction to evaluate revegetation success in accordance with its E&SCP. Areas that have not revegetated successfully would be corrected to ensure the conditions of areas disturbed during construction are similar to the surrounding undisturbed areas. With adherence to the protocols outlined in PennEast's E&SCP, we determine that revegetation would be successful.

4.2.2.5 Shallow Bedrock

Based on existing soils and geologic map data, about 33 miles of the PennEast Pipeline and laterals would cross soils with shallow bedrock. As a result, PennEast anticipates that rock excavation and/or rock blasting would be necessary for trench excavation in some areas as discussed in section 4.1.

The introduction of subsoil rocks into agricultural topsoil would be minimized by segregating topsoil from trench spoil and replacing topsoil in agricultural areas after cleanup. PennEast would make diligent efforts to remove excess rock from surficial soils to the extent practicable in cultivated and rotated croplands, hayfields, pastures, residential areas, and at landowner request in other areas. Excess rock would be removed from surface soils disturbed by construction such that the size, density, and distribution of rock on the construction right-of-way would be similar to adjacent non-right-of-way areas. PennEast would not remove rocks from backfilled areas if the rock in the backfill is consistent in size and density with conditions in adjacent undisturbed areas once the pipe protected by padding the pipe with imported sand or screened trench soils. If bedrock is encountered, PennEast would take precautions to minimize the mixing of excavated bedrock with backfill and would replace rock in the trench to a level that is not higher than the original bedrock profile. If blasting is required, the minimum explosive charge necessary would be used to fracture bedrock along with the use of blast mats. This would minimize shot-rock from leaving the construction right-of-way. Where necessary, excess rock would be hauled off the right-of-way or left on the right-of-way, subject to landowner approval and applicable permit conditions.

In the event that bedrock is encountered within the trench depth in residential or agricultural lands crossed by the Project, several measures to prevent incorporation of rock into the topsoil would be implemented. These measures include topsoil segregation and protection along the trench, rock backfill in residential and agricultural areas only to the top of the existing bedrock profile, and disposal of excess rock fragments in an approved manner so as to not incorporate rock fragments into topsoil layers. Through adherence to these measures, no significant increase in the rock content of topsoil in residential or agricultural areas is anticipated.

4.2.2.6 Contaminated Soils

Soil contamination along the proposed Project could result from at least two sources: new spills of hazardous material or fuel during construction, and/or those occurring before construction in pre-existing contaminated areas that are encountered during construction. Contamination from spills or leaks of fuels, lubricants, and coolant from construction equipment could adversely affect soils. The effects of such contamination are typically minor because of the low frequency and volumes of spills and leaks. PennEast has developed an SPCC Plan that specifies cleanup procedures to minimize the potential for soil contamination from spills or leaks of fuel, lubricants, coolants, or solvents that we have reviewed and find acceptable. PennEast and its contractors would use the SPCC Plan to minimize accidental spills of materials that could contaminate soils, and to ensure that inadvertent spills of fuels, lubricants, or solvents are contained, cleaned up, and disposed of as quickly as possible and in an appropriate manner.

In the event that contamination is encountered during construction, PennEast would implement the protocols in its Unexpected Contamination Encounter Procedures. If contaminated soils are encountered during construction, all personnel would stop work, leave the contaminated area, and notify the chief inspector on-site. Additional notifications would then be made, including outside agencies if required. PennEast would transport excavated soil to designated soil staging areas, characterize the soils for waste disposal, and ensure that all soils are managed in accordance with state and federal regulations. We have reviewed these plans and conclude that implementation of these plans would provide adequate environmental protection during pipeline construction and operation.

4.3 WATER RESOURCES

4.3.1 Groundwater Resources

Along the proposed Project route, groundwater is a significant source of drinking water in selected areas and is also used for agricultural, industrial, and mining purposes. In Pennsylvania 56 percent of the public and private domestic water use comes from groundwater sources. Groundwater is withdrawn for domestic use as well as mining, industrial, and agricultural purposes (PADNCR 2015). In New Jersey groundwater provides 36 percent of the domestic pubic water and 16 percent of the private supply. Groundwater in New Jersey also supplies mining, agriculture (including aquaculture), industrial, and geothermal demands. Groundwater flow generally reflects surface topography. Although depth to groundwater is variable along the proposed pipeline route, groundwater is often found near the ground surface, and the Project may encounter groundwater during construction activities in areas close to wetlands or surface water bodies. PennEast has conducted a boring program to identify areas of potential liquefaction due to earthquakes and have found in general the water table is ten to twenty feet below the ground surface.

Bedrock aquifers as well as unconsolidated alluvium and glacial sand and gravel aquifers are found in the Project area. Additional information on the aquifers that occur along the Project route, including; bedrock aquifers, surficial aquifers, sole-source aquifers, state-designated aquifers, wellhead and aquifer protection areas, wells, springs, and contaminated groundwater, is presented below.

In general, the Project route crosses through four principal aquifers as defined by the USGS (2003), focused on bedrock type. These include the Valley and Ridge Aquifers, New York and New England Aquifers, Piedmont and Blue Ridge Aquifers, and Early Mesozoic Basin Aquifers (table 4.3.1-1). These aquifers are more fully discussed in section 4.3.1.1 below.

TABLE 4.3.1-1

Principal Bedrock Aquifers Crossed by the PennEast Pipeline Project

Facility / County	Aquifer Type	Rock Type	Begin Milepost	End Milepost
Pennsylvania Mainline				
Luzerne	Valley and Ridge Aquifers	Sandstone and carbonate-rock	0.0	17.9
Luzerne	NA	Other Rocks	17.9	22.2
Luzerne/ Carbon	Valley and Ridge Aquifers	Sandstone and carbonate-rock	22.3	23.3
Carbon	NA	Other Rocks	23.4	38.3
Carbon	Valley and Ridge Aquifers	Sandstone and carbonate-rock	38.4	47.9
Carbon	New York and New England Aquifers	Carbonate-rock	48.0	51.1
Carbon/ Northampton	Valley and Ridge Aquifers	Sandstone and carbonate-rock	51.1	64.7
Northampton	Valley and Ridge Aquifers	Sandstone and carbonate-rock	64.8	70.2
Northampton	Piedmont and Blue Ridge Aquifers	Carbonate-rock	70.2	75.9
Bucks	Piedmont and Blue Ridge Aquifers	Carbonate-rock	76.0	77.6
Kidder Compressor Station				
Carbon	NA	Other Rock	26.6	26.8

TABLE 4.3.1-1 Principal Bedrock Aquifers Crossed by the PennEast Pipeline Project				
Facility / County	Aquifer Type	Rock Type	Begin Milepost	End Milepost
Hellertown Lateral				
Northampton	Piedmont and Blue Ridge Aquifers	Carbonate-rock	0.0	2.1
New Jersey Mainline				
Hunterdon	Piedmont and Blue Ridge Aquifers	Carbonate-rock	77.6	81.2
Hunterdon	Early Mesozoic Basin Aquifers	Sandstone	81.2	104.4
Mercer	Early Mesozoic Basin Aquifers	Sandstone	104.4	114.0
Gilbert Lateral				
Hunterdon	Piedmont and Blue Ridge Aquifers	Carbonate-rock	0.0	0.6
Lambertville Lateral				
Hunterdon	Early Mesozoic Basin Aquifers	Sandstone	0.0	1.4

N/A = Not Available
Source: USGS 2003

4.3.1.1 Surficial Aquifers

Surficial aquifers occur at or near the land surface and occur in the overburden of soils and moraine. They can interact with surface waterbodies which can act as discharge or recharge gradients in groundwater to surface water interactions. Table 4.3.1-2 lists surficial aquifers crossed by the Project.

The Project would cross two major types of surficial aquifers in Pennsylvania, namely those that are the result of till and glacial lake deposits and those that are sand and gravel aquifers at or near the land surface and alluvium along streams and rivers. Existing data on the presence of surficial aquifers is not available for all portions of the proposed route in Pennsylvania. However, several small outwash deposits that may have water supply potential occur near rivers and streams in Bucks County.

The surficial aquifer areas in New Jersey can include till, moraine deposits, lake bottom sediments, sand and gravel, and surficial sediment thicker than 50 feet overlying coastal plain aquifers (NJDEP 1998). In New Jersey they are largely associated with surface water channels and, buried glacial valley aquifers. Based upon review of New Jersey Geo-web surficial aquifers data, no named surficial aquifers occur within the Project area in New Jersey (NJDEP 1998). The terminus of the pipeline in Mercer County occurs near the unconfined surficial aquifer of Rancocas Creek basin (USGS 2014) but does not cross this basin aquifer system.

TABLE 4.3.1-2 Surficial Aquifers Crossed by the PennEast Pipeline Project			
Facility / County	**Aquifer Type**	**Begin Milepost**	**End Milepost**
Pennsylvania Mainline			
Luzerne	Till and glacial lake deposits	0.0	5.0
Luzerne	Sand and gravel aquifers at or near land surface and alluvium along streams and rivers	5.0	7.5
Luzerne	Till and glacial lake deposits	7.5	23.0
Carbon	Till and glacial lake deposits	23.0	51.3
Northampton	Till and glacial lake deposits	51.3	71.0
Bucks	Pre-Illinoisan and Wisconsin glacial outwash	76.8	77.4
Kidder Compressor Station			
Carbon	Till and glacial lake deposits	26.6	26.8
Hellertown Lateral			
Northampton	N/A	N/A	N/A
New Jersey Mainline a/			
N/A	N/A	N/A	N/A
Gilbert Lateral			
N/A	N/A	N/A	N/A
Lambertville Lateral			
N/A	N/A	N/A	N/A

Note:
N/A = Not Available
Pennsylvania Source: Trapp and Horn (1997) (USGS)
New Jersey Source: NJDEP NJGS DGS98-5 (1998)
a/ According to NJDEP source, no surficial aquifers are mapped within the Project area corridor.

4.3.1.2 Bedrock Aquifers

As discussed section 4.1.1 geologic units occur within three of the physiographic provinces in Pennsylvania: the Appalachian Plateaus Province, the Ridge and Valley Province, and the New England Province. The Appalachian Plateaus Province consists of bedrock of various types, mainly sandstones and siltstones (PADCNR 2000). The Ridge and Valley physiographic province consists primarily of sandstone, siltstone, shale and carbonate rocks (PADCNR 2000). The New England Province is made up of largely granitic gneiss, granodiorite, and quartzite. These rocks are very resistant to weathering and remain highly stable and not prone to erosion.

Bedrock aquifers are composed of unbroken solid rock such as limestone, dolomite, sandstone, siltstone, shale, or crystalline rock. Bedrock aquifers crossed by the Project in Pennsylvania would include 40 geologic formations (appendix G-4). Bedrock aquifers crossed by the Project in New Jersey would include five named aquifers or related confining geologic units (table 4.3.1-2). These aquifers and confining units occur in the Highlands and Piedmont physiographic provinces of New Jersey. The Highlands Province is underlain by metamorphosed igneous and sedimentary rocks. The Piedmont Province is underlain by folded and faulted sedimentary and igneous rocks and small bands of metamorphosed rocks. Geography includes a low rolling plain divided by a series of higher ridges and steep front faces with long back slopes (NJDEP 2003).

TABLE 4.3.1-3 Bedrock Aquifers Crossed by the PennEast Pipeline Project in New Jersey			
Facility / County	Aquifer Type	Begin Milepost	End Milepost
PennEast Mainline			
Hunterdon	Igneous and metamorphic rocks	77.7	78.3
Hunterdon	Jacksonburg Limestone, Kittatinny Supergroup, and Hardyston Quarzite	78.3	78.5
Hunterdon	Brunswick aquifer conglomerate	78.5	81.9
Hunterdon	Brunswick aquifer	81.9	92.5
Hunterdon	Lockatong Formation	92.5	95.8
Hunterdon	Stockton Formation	95.8	98.5
Hunterdon	Diabase	98.5	99.3
Hunterdon	Lockatong Formation	99.3	100.0
Hunterdon	Brunswick aquifer	100.0	102.6
Hunterdon	Diabase	102.6	103.6
Hunterdon	Brunswick aquifer	103.6	104.1
Hunterdon	Lockatong Formation	104.1	104.4
Mercer	Brunswick aquifer	104.4	106.5
Mercer	Diabase	106.5	108.1
Mercer	Brunswick aquifer	108.1	114 (End)
Gilbert Lateral			
Hunterdon	Brunswick aquifer conglomerate	0.0	0.6
Lambertville Lateral			
Hunterdon	Brunswick aquifer	0.0	1.4

4.3.1.3 Sole Source Aquifers

Sole source aquifers (SSA) are designated by the EPA and defined as aquifers that supply at least 50 percent of the drinking water consumed by the communities overlying the aquifer. These areas are designated as critical resources, as the communities that use them have no alternative drinking water source(s) which could physically, legally, and economically supply potable water to those who depend upon the aquifer. The Project would cross both the Northwest New Jersey 15 Basin Sole Source Aquifer and the Coastal Plain Sole Source Aquifer. The Northwest New Jersey 15 Basin SSA would be crossed from MP 111.9 to MP 112.2 and from MP 112.3 to MP 114.02. This system includes portions of the Delaware River. The Northwest New Jersey 15 Basin SSA occurs within portions of the Valley and Ridge, Highlands, and Piedmont physiographic provinces of the state of New Jersey. This SSA extends beneath Hunterdon, Mercer, Middlesex, Morris, Somerset, Sussex, Warren, and Passaic counties. Shallow groundwater is typically within the range of 30 to 40 feet of the surface, within the drift and till moraine overburden that occurs north of the Wisconsin glaciation fall line across the center of the state. The Northwest New Jersey 15 Basin SSA supplies potable water to 69 communities within the

Piedmont Province of northern New Jersey (Khorsand, S. 2001). Water depth in the Valley and Ridge Province is within 300 feet of the land surface and water storage occurs in carbonate rocks overlain by glacial deposits. Water storage aquifers in the Highlands Province occurs in fractured and weathered bedrock seams within 300 feet of the land surface and storage within the Newark Group of aquifers present in the Piedmont province occurs in weathered joint and fracture systems within the upper 200 to 300 feet depth of the land surface (Khorsand, S. 2001).

In general, the coastal plain aquifer system is characterized by a series of hydrologic units of varying thickness, lateral extent, and water bearing characteristics largely composed of unconsolidated sediments occurring in a subsurface wedge beneath land surface (NJDEP 1985). The Coastal Plain Sole Source Aquifer would be crossed at three locations by the mainline: between MP 77.6 and MP 90.5, MP 90.7 and MP 90.8, and MP 96.54 and MP 108. It would also be crossed by the Gilbert Lateral between MP 0.0 and MP 0.13 and the Lambertville Lateral between MP 0.0 and MP 0.72.

4.3.1.4 Wellhead and Aquifer Protection Areas

The Project would cross wellhead protection areas (WHPA) in both Pennsylvania and New Jersey. A WHPA is defined by the EPA as the surface and subsurface area surrounding a well or wellfield supplying a public water system, through which contaminants are reasonably likely to move toward and reach a drinking water well or wellfield. WHPAs are delineated by zones based on distance from the wellhead in Pennsylvania (Pennsylvania Code 1994) and Tiers based upon travel time of contaminants to the wellhead and hydrologic boundaries in New Jersey (NJDEP 2003). These time-period based zones are referenced and mapped as Tier 1, Tier 2, and Tier 3 zones, respectively. The identification of WHPAs allows potential pollution sources to be managed in relation to their location within the WHPA. Based on publicly available information, PennEast has identified 122 WHPAs within 5 miles of Project facilities, recognizing that there may be multiple WHPAs associated with a single Public Community Water Supply (PCWS) well in New Jersey.

Within Pennsylvania, WHPA data is not publicly available. However, PennEast has identified two (2) known WHPAs located within 5 miles of the Project workspace in Pennsylvania. These WHPAs are both associated with wells located in Bucks County, Pennsylvania.

According to the New Jersey Geological and Water Survey, there are 59 PCWS wells located within 5 miles of the Project workspace in Warren, Hunterdon, and Mercer counties, New Jersey. In total, all Tier 1, Tier 2, and Tier 3 zones associated with these 59 PCWS wells results in 120 such zones that would be located within 5 miles of the Project facilities in New Jersey.

The Project would cross three WHPAs. Post-construction operations would result in a standard, 50-foot permanent easement associated with the pipeline to allow for operations and maintenance activities. PennEast intends to conduct routine vegetation management on a 30-foot-wide operational easement in accordance with FERC Plan and Procedures. The use of pesticides, herbicides, or fertilizers would not be permitted within WHPAs. PennEast continues to correspond with appropriate WHPA management authorities.

4.3.1.5 Water Supply Wells

Based on review of the Pennsylvania Department of Conservation and Natural Resources (PADCNR) Pennsylvania Groundwater Information System, no public and/or private water supply wells or springs are located within 150 feet of the pipeline construction workspace in Pennsylvania. PennEast also observed no public or private water supply wells in Pennsylvania during its field investigations completed as of August 20, 2015; however, the route has been modified since these surveys were completed.

PennEast identified two public supply wells near the proposed pipeline in Alexandria Township in Hunterdon County, New Jersey (table 4.3.1-4). These wells are near MP 84.7 and would be within 90 and 149 feet of the proposed workspace. The well within 149 feet of the workspace was identified as having been replaced by the well located within 90 feet of the workspace. PennEast has not determined if the former well was officially abandoned at the time of the PennEast survey. PennEast evaluated a potential route variation to move the pipeline further from these wells but did not adopt the deviation due to additional land disturbance and the location of the well in a paved parking lot (see Route Variation 55 discussed in section 3.3.2). PennEast has not identified private wells in the vicinity of the Project in New Jersey, but would identify private wells along the New Jersey segment of the pipeline using available public records and interviews with existing homeowners.

TABLE 4.3.1-4

Public and Private Water Supply Wells within 150 Feet of Pipeline Construction Workspaces

Nearest Milepost	Township	County	Supply Type	Distance from Workspaces (feet)
Pennsylvania – Private Wells				
None	None	None	None	None
Pennsylvania – Public Wells				
None	None	None	None	None
New Jersey – Private Wells a/				
TBD	TBD	TBD	TBD	TBD
New Jersey – Public Wells				
84.7	Alexandria	Hunterdon	Public Supply	90
84.7	Alexandria	Hunterdon	Public Supply	149

TBD – To be determined based on public information and surveys/interviews with existing landowners.
Sources:
Pennsylvania Public and Private Wells: http://www.dcnr.state.pa.us/topogeo/groundwater/pagwis/index.htm
New Jersey Public Wells: http://www.state.nj.us/dep/njgs/geodata/dgs97-1.htm

Because PennEast has not conducted surveys for water supply wells along the entire Project, **we recommend that:**

- **<u>Prior to construction</u>, PennEast should complete all necessary surveys for water supply wells and groundwater seeps and springs, identify public and private water supply wells within the construction workspace, and file with the Secretary a revised list of water wells and groundwater seeps and springs within 150 feet of any construction workspace (500 feet in areas characterized by karst terrain).**

PennEast has prepared a Well Monitoring Plan to outline procedures for pre- and post-construction monitoring of all identified drinking water supply wells, including private, community, municipal/public wells, and springs, within 150 feet of the proposed construction workspace. PennEast would conduct pre- and post-construction monitoring for water quality and yield for private and public wells within 150 feet of the proposed construction workspace. In the event that any water supply's quantity or quality is affected during construction, PennEast would provide an alternate water supply source or pay damages to the landowner for a new, analogous well. PennEast would file a report with the Secretary within 30 days of completion of construction detailing landowner complaints received regarding well quality and yield, and how these complaints were addressed and/or resolved. We have reviewed the Well Monitoring Plan and find it acceptable.

4.3.1.6 Seeps and Springs

Groundwater seeps and springs identified within or near the proposed workspace by PennEast during field investigations in Pennsylvania are listed in table 4.3.1-5.

TABLE 4.3.1-5

Field-Identified Springs and Seeps within 150 feet of Construction Work Area

Feature ID	Type	Milepost	Distance to Workspace (feet)	Direction to Workspace	Township / County
Pennsylvania					
1/18/2015	groundwater seeps	3.1	In workspace	N/A	Kingston / Luzerne
12/18/2014	groundwater seep	13.6	In workspace	N/A	Bear Creek / Luzerne
12/19/2014	groundwater seep	19.9	135	East	Bear Creek / Luzerne
052215_JC_1003_I_MI	groundwater seep	43.9	N/A – crossed by HDD	N/A	Towamensing / Carbon
New Jersey					
060515_SQ_1001_SEEP	groundwater seep	106.8	25	North	Hopewell / Mercer

N/A = Not applicable

Groundwater seeps identified at MP 3.1 and MP 13.6 are associated with crossings of waterbodies at these same locations. At MP 3.1, the pipeline crosses a stream classified as a cold water fisheries (CWF) and migratory fisheries (MF). At MP 13.6, the pipeline crosses an unnamed tributary classified as a CWF and migratory fishes. Groundwater seeps if discharging to a surface waterbody would assume the same water quality classification assigned to the surface water feature at which it meets for discharge. However, the groundwater seep may not be able to meet the designated uses (i.e., fisheries) assigned to the water quality classification based on limitations of depth or intermittent hydrology. Work occurring in and around the groundwater seeps would occur in a manner consistent with BMPs for stream crossings and the seep channels would be restored following pipeline installation.

If a groundwater seep would be affected by construction, PennEast would document the hydrologic characteristics of the seep prior to installation of the pipeline, including identification of the source or cause of the seep. If possible the seep would be temporarily redirected around the construction area. Restoration of the seep would include restoration of the pre-construction topography, and a determination whether a perching layer would need to be restored. During future field surveys completed by PennEast, additional seep and spring locations would be recorded and documented as they are encountered.

As discussed in section 4.3.1.6, PennEast has prepared a Well Monitoring Plan to outline procedures for pre- and post-construction monitoring of all identified drinking water supply wells, including springs, within 150 feet of the proposed construction workspace.

4.3.1.7 Potential Contaminated Groundwater

PennEast identified areas of potential groundwater contamination through a review of the PADEP's Land Recycling Cleanup Locations program (PADEP 2015), and NJDEP's currently known groundwater contamination data (NJDEP 2014a), and by commissioning a review of public data by EDR (EDR 2015). Table 4.3.1-6 lists sites with potential groundwater contamination that would be crossed by the Project. Based on the geology and hydrogeology in these areas it is expected that the pipeline would be located above the water table and therefore not encounter potential groundwater contamination.

PennEast has prepared an Unanticipated Discovery of Contamination Plan that includes measures it would follow if any unanticipated contaminated soils are encountered during construction. If contaminated soils are found they would be managed in accordance with applicable federal and state regulations and the standard operating procedures in the Unanticipated Discovery of Contamination Plan. PennEast would prohibit the refueling or storage of hazardous materials from occurring within a 200-foot radius of private wells, and 400-foot radius of community and municipal wells without an approved variance. We have reviewed the Unanticipated Discovery of Contamination Plan and find it acceptable, with the exception of the identification of responsible personnel. Therefore, **we recommend that:**

- **<u>Prior to construction</u>, PennEast should file with the Secretary an updated Unanticipated Discovery of Contamination Plan for the Project to identify the management and field environmental professionals responsible for notification for contaminated sites.**

Additionally, the Project would be constructed more than 0.25 mile to the east and upgradient of the Palmerton Zinc Pile Superfund site boundary. Portions of the Project, between MPs 47 and 52, would occur within a 1-mile buffer zone from the Superfund site; however, the Palmerton Zinc Pile Superfund site is not located within the Project's survey corridor. PennEast consulted with the EPA regarding potential impacts of the pipeline on the Superfund site and it was determined that the pipeline would not impact existing and/or on-going Superfund site remedies, and that levels of contamination, if existing outside of the Superfund site boundary, would have been within an acceptable risk threshold and remedial action would not be required. Other potential sources of contamination are discussed in section 4.2.1.5.

TABLE 4.3.1-6

Sites with Potential Groundwater Contamination crossed by the Project

Site Name	Nearest Milepost	Site Address	Database	Distance from Project Workspace (feet)	Direction from Workspace to Site
Pennsylvania					
PPL Martins Creek LLC/Jenkins CTG	9.5	Market St, Village of Laflin Laflin, PA	PA EFacts	130	Southwest
Encor Coatings Inc.	62.7	Route 248 Bath, PA	ICIS, NCDB	Within Workspace	Within Workspace
New Jersey					
United Reform Church	89.4	97 Horseshoe Bend Rd, Frenchtown, NJ 08825	RCRA-LQG, NJEMS	25	East

Key:
PA EFACTS: The Department's eFACTS (Environment, Facility, Application, Compliance Tracking System) database (formerly known as the Foundation for Information eXchange (FIX)) is a Department-wide database that provides a holistic view of the clients and sites (including facilities) that DEP regulates.
ICIS: The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.
PALUST/NJLUST: A listing of regulated Underground Storage Tanks that have reported leaking and a cleanup is underway.
The National Compliance Database (NCDB) supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act).
RCRA-LQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites, which generate, transport, store, treat, and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.
NJEMS: NJEMS Sites are points representing sites regulated by NJDEP under one or more regulatory permitting or enforcement programs, or sites that are otherwise of some interest to a NJDEP program. Program interests included in NJEMS are Air, Communications Center, Discharge Prevention, Exams and Licensing, Fish Game and Wildlife, Green Acres, Hazardous Waste, Lab Certification, Land Use, Landscape Irrigation, Parks and Forestry, Pesticides, Pinelands, Planning, Radiation, Right-to-Know, Site Remediation, Soil Conservation, Solid Waste, TCPA, Water Quality, Water Supply, and Watershed Management.
Sources:
EDR, 2015; PADEP, 2015; NJDEP, 2014a

4.3.1.8 General Impacts and Mitigation for Groundwater Resources

The proposed Project would not be expected to significantly impact groundwater quality or quantity during construction or operation. The proposed pipeline installation would involve the excavation of a trench between about 7 and 10 feet deep to allow burial of the pipeline with 3 to 4 feet of cover. This depth is confined to surficial aquifers near the ground surface and would not directly impact deeper bedrock aquifers crossed by the Project, nor is it expected to significantly affect groundwater discharge or recharge patterns in the deeper aquifers being recharged by precipitation in these areas. Minor temporary impacts on groundwater may include changes in percolation rates from clearing of vegetation, dewatering of the trench and bore pits, soil mixing and compaction prior to restoration, and blasting. Clearing vegetation from within the construction right-of-way would remove this natural filter layer and localized runoff may be enhanced in the disturbed areas of the right-of-way during construction activities. The reduction in infiltration rates along the right-of-way and increase in surface runoff during storm events could result in increases in localized soil erosion and sedimentation. PennEast would implement its E&SCP and our Plan and Procedures to minimize erosion potential of soils in the right-of-way, minimize the mobilization of soils on steep slopes via storm water runoff, and minimize sedimentation in waterbodies crossed by the right-of-way.

The shallow depths of overburden disturbance for pipeline burial would be above the groundwater table in most of the aquifers identified and would not impact groundwater discharge or recharge patterns in the deeper aquifers being recharged by precipitation in these areas. Therefore, no effect to recharge of any SSA would be expected to occur. PennEast would implement an SPCC Plan to prevent or respond to any spill or releases of oil or fuel during construction. In the event of a natural gas leak, the gas would discharge to the atmosphere and not directly impact underlying groundwater.

Trenching activity for pipeline installation would result in disturbance and redistribution of surface soils and shallow subsurface soils. This disturbance, however, would be temporary and limited to the construction right-of-way and workspace. The accumulation of water in low lying areas of the open trench, which may require dewatering of the trench, could also affect immediate surficial groundwater flow patterns. Any impacts from water accumulation in the open trench and trench dewatering, including changes in the volume or rate of groundwater infiltration across the trench area, would be short-term and limited to the period of construction. PennEast would use special dewatering methods as appropriate and would install trench breakers where appropriate to control water flow along the trenchline. Use of seeding and mulching material would be used to stabilize post construction soils and implementation of the E&SCP would allow for establishment of a vegetative ground cover and percolation of precipitation into the shallow groundwater.

In areas where blasting or rock hammering may be needed to excavate the trench to proper depth, fracturing of the bedrock may result in shallow groundwater infiltration in these areas. Blast charges would be limited to that needed to fracture rock to the required trench depth, and fracturing of bedrock would therefore be limited to within several feet of the pipeline trench. All blasting would be performed in a manner consistent with the guidance in PennEast's Project-specific Blasting Plan.

The Revised Karst Mitigation increases evaluation from 150 feet to 500 feet for wells and springs within areas of karst terrain. The Well Monitoring Plan includes separate sections for karst terrain well and spring monitoring. The Revised Karst Monitoring Plan also includes a discussion on the use of BMPs in karst terrain during construction for the protection of groundwater resources.

4.3.1.9 Conclusion

No long-term impacts on groundwater are anticipated from construction and operation of the Project because disturbances would be temporary, erosion controls would be implemented, natural ground contours would be restored, and the right-of-way would be revegetated. Implementation of PennEast's E&SCP, as well as our recommendations, would limit impacts on groundwater resources.

4.3.2 Surface Water Resources

Surface water resources crossed by the Project would include rivers, streams, associated tributaries, lakes, wetlands, and stormwater catchment basins. Surface water resources crossed by the Project were identified through field surveys conducted by PennEast. In areas where access was denied, PennEast obtained data from existing publicly available data including the National

Hydrography Dataset (NHD), NJDEP, PADCNR, NRCS county soils surveys, watershed data from USGS, and aerial photography of the pipeline route.

The pipeline would cross three major basins including the Upper Susquehanna, the Upper Delaware, and the Lower Hudson basins. The mainline would cross several watersheds in Pennsylvania including the Upper Susquehanna, Upper Lehigh River, Middle Lehigh River, Pohopoco Creek, Aquashicola Creek, Lower Lehigh River, and the Bushkill Creek-Delaware River watersheds. The Hellertown Lateral would cross the Lower Lehigh River Watershed and the Kidder Compressor Station would be located within the Middle Lehigh River Watershed.

In New Jersey, the mainline would cross the Lower Delaware River and Millstone River watersheds. The Gilbert and Lambertville laterals would cross the Lower Delaware River watershed.

The Project would cross a total of 7,231 feet within waterbodies, with about 74 percent of that distance occurring in Pennsylvania. Overall, about 73 percent of the waterbodies that would be crossed by the Project are classified as minor, with 22 percent classified as intermediate and 4 percent classified as major.

4.3.2.1 Existing Surface Water Resources

The hydrologic regimes for surface waters crossed by the Project are classified into one of four categories: perennial, intermittent, ephemeral, and open water (table 4.3.2-1). About 65 percent of the waterbodies that would be crossed by the Project are classified as perennial; 17 percent are classified as intermittent, and 12 percent are classified as ephemeral. The remaining 6 percent of waterbodies include lakes, ponds, and ditches.

Each waterbody crossing is listed in appendix G-5 and G-6. Some information is based on field surveys completed by PennEast. However, where survey access has not been granted to PennEast, waterbody information is based on publicly available data.

For the purpose of assigning waterbody crossing methods the FERC Procedures define waterbody crossings by size (width) as minor, intermediate, or major[15]. The majority of the waterbodies that would be crossed by PennEast would be minor (125 in Pennsylvania; 62 in New Jersey). PennEast would also cross 33 intermediate and 7 major waterbodies in Pennsylvania, and 24 intermediate and 4 major waterbodies in New Jersey.

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[15] FERC classifies waterbodies as any natural or artificial stream, river, or drainage with perceptible flow at the time of crossing, and other permanent waterbodies such as ponds and lakes: "minor waterbody" (Minor) includes all waterbodies less than or equal to 10 feet wide at the water's edge at the time of crossing; "intermediate waterbody" (Intermediate) includes all waterbodies greater than 10 feet wide but less than or equal to 100 feet wide at the water's edge at the time of crossing; and "major waterbody" (Major) includes all waterbodies greater than 100 feet wide at the water's edge at the time of crossing. PennEast determined FERC Classifications for NHD waterbodies by measuring the distance of the waterbody at the crossing point using aerial photographs. If the stream was not visible on the aerial photograph the stream was designated as minor, with a crossing distance of "<10" feet. Classification may change based on conditions at time of construction.

TABLE 4.3.2-1 Summary of Waterbodies Crossed by the Pipeline Facilities a/					
Facility	**Perennial Waterbody Crossing**	**Intermittent Waterbody Crossing**	**Ephemeral Waterbody Crossing b/**	**Open Water c/**	**Total**
Pennsylvania					
PennEast Mainline	84	40	33	7	164
Hellertown Lateral	1	0	0	0	1
New Jersey					
PennEast Mainline	72	5	7	4	84
Gilbert Lateral	0	0	0	0	0
Lambertville Lateral	2	0	0	0	2
Project Total	**159**	**45**	**40**	**11**	**251**

Notes:
a/ Waterbody type for non-surveyed waterbodies was determined using NHD data.
b/ Ditches are included as ephemeral waterbody crossings.
c/ Open water consists of waterbodies (ponds, lakes, and rivers) over 100 feet wide or crossings greater than 100 feet wide.

4.3.2.2 Sensitive Waterbodies

Sensitive waterbodies include, but may not be limited to:

- rivers on or designated to be added to the Nationwide Rivers Inventory (NRI), the National Wild and Scenic River System, or a state river inventory;
- waters identified as outstanding/exceptional resource waters;
- waterbodies that contain threatened or endangered species or critical habitat;
- waterbodies located in sensitive and protected watershed areas;
- surface waters that have significant or vital riparian areas;
- waterbodies that are crossed less than 3 miles upstream of potable water intake structures;
- waters classified by the state or EPA as impaired waters;
- surface waters that have established or planned Total Maximum Daily Loads (TMDLs) for nutrients or contaminants;
- waters of significant ecological and recreational importance; and
- waterbodies and intermittent drainages that are highly susceptible to erosion due to steep banks, wide ranges in discharge flows, or actively eroding banks.

National or State Wild and Scenic Rivers

The Project does not cross any reach of waters listed in the NRI database (NPS 2015) or any water course reach included in the National Wild and Scenic River System (NWSRS). The Project would cross the Lehigh River at MP 23.0, using the dry crossing method, within a mile upstream of a segment of the Lehigh River which is designated on the NRI for an outstandingly remarkable value for recreation and geology (NPS 2015). Since the Project crossing occurs upstream of this reach, the Project would not impact the NRI-designated portion of the river. In addition, this segment of the Lehigh River is designated as a Pennsylvania Scenic River. The

Project would not impact this segment of the river. The Project would also cross the Lehigh River/Lehigh Canal via HDD at MP 70.9-71.1

Specific reaches of the Delaware River in New Jersey have been designated as a National Wild and Scenic River; however, the proposed pipeline crossing would not cross the Delaware River within a designated NWSRS reach. The proposed crossing near MP 77.6 is about 9 miles south (downstream), and about 2 miles north (upstream) of portions of the Delaware River that are designated as National Wild and Scenic. In addition, the Delaware River would be crossed by HDD and therefore no in-channel disturbance would occur, nor are impacts anticipated on the lower NWSRS reach for the Delaware River.

State-Designated High-Quality and Exceptional Value Waters

The Project would cross multiple waterbodies that fall under various state classifications in both Pennsylvania and New Jersey. Aquatic habitats are classified based on Pennsylvania and New Jersey surface water quality regulations. These water quality regulations have established systems for classifying waterbodies with the intent of protecting and maintaining their ecological communities.

- For Pennsylvania, the PFBC and PADEP classifies fisheries as warm water fisheries (WWF), CWF, MF, and trout stocked fisheries (TSF) (Pennsylvania Code Title 25, Chapter 93) (Pennsylvania 2015). Within these classifications, waterbodies are also designated as an exceptional value (EV) or high quality (HQ) resource waters. The PFBC also defines waterbodies based on their ability to support the propagation of wild or stocked trout.
- For New Jersey, the NJDEP classifies all freshwater as either FW1 or FW2 (NJAC 2009). In addition, waters are defined as either a Category 1 (C-1) or Category 2 (C-2) water[1]. NJDEP (NJAC 2009) also classifies waterbodies for their ability to support trout and other fishery resources as follows:
    - a trout production (TP) classification is used for freshwaters that are suitable for trout reproduction;
    - a non-trout (NT) classification is used for freshwaters that support warm water fisheries and may allow for trout survival, but not reproduction;
    - a trout maintenance (TM) classification is used for those freshwaters that support trout year-round; and
    - a trout stocked classification is used for those freshwaters that are not suitable for trout year-round, but are stocked with trout for recreational uses.

PennEast has conducted surveys of the Project area in order to determine the list of waterbodies that would be crossed, the details regarding the potential crossing, and information

[1] FW1 waters are to be maintained in their natural state of quality (set aside for posterity) and not subjected to any man-made wastewater discharges or increases in runoff from anthropogenic activities. These waters are set aside for posterity because of their clarity, color, scenic setting, other characteristics of aesthetic value, unique ecological significance, exceptional recreational significance, exceptional water supply significance or exceptional fisheries resources (NJAC 2009). FW2 waters are freshwaters that are not designated as FW1 or pinelands waters (NJAC 2009).

regarding the aquatic habitats and aquatic biological resources that could potentially occur in the Project area. However, areas where access was denied and surveys are pending, waterbody crossing data were interpreted from existing databases maintained by the PFBC and NJDEP. USGS 7.5-minute series topographic maps were also used to identify waterbody names, tributaries, and general flow regimes.

<u>Pennsylvania</u>

In Pennsylvania, HQ or EV waters are designated as having high quality aquatic habitats and water resources that support ecologically unique or recreational important fisheries. In order for a surface water to be classified as HQ, the waterbody must meet water quality or biological parameters outlined in Pennsylvania Code Title 25 Chapter 93b. In order to quality as an EV waterbody, the surface water must meet the criteria for a HQ waterbody and at least one of the following:

- is located in a national wildlife refuge or a state game propagation and protection area;
- is located in a designated state park natural area or state forest natural area, national natural landmark, federal or state wild river, federal wilderness area, or national recreation area;
- is a surface water of exceptional recreational significance;
- is a surface water of exceptional ecological significance;
- is a surface water scoring at least 92 percent in the appropriate biological assessments; or
- is designated as a wilderness trout stream.

HQ or EV waters include CWF that support or maintain naturally reproducing trout populations or provide suitable habitat to support trout species. In Pennsylvania, trout water classifications include approved trout waters (ATW) that are stocked with trout, stream sections that support natural reproduction of trout, and wilderness trout streams (WTW). Class A wild trout streams and stream sections that support natural reproduction of trout are defined as streams that support a population of naturally produced trout of sufficient size and abundance to support a long-term fishery. Appendix G-7 provides PFBC fishery classifications for individual waterbody crossings in Pennsylvania by milepost as well as the proposed crossing method. High quality or EV waters and waters with trout classifications that would be crossed by the Project are summarized in table 4.3.2-2.

TABLE 4.3.2-2					
Summary of Pennsylvania-Classified Designated Waterbodies Crossed by the Project a/					
Facility	Pennsylvania Code Designated/Existing Use	PFBC Fishery Designations b/			
	HQ/EV	HQ/EV	ATW	WTW	WWCW
PennEast Mainline c/	70	18	5	131	146
Hellertown Lateral	0	0	0	1	1

Notes:
a/ An individual stream crossing could have more than one designation. Pennsylvania-classified designated waterbodies include High Quality and Exceptional Value Waters, and Waters with Trout Designations.
b/ Wild Trout Waters, Natural Reproduction, January 2015 (PFBC 2015a), Wild Trout Waters (PFBC 2015b), Class A Waters, December 2013 (PFBC 2015c).
Wild Trout Waters include:
–Class A Wild Trout Streams: Streams that support a population of naturally produced trout of sufficient size and abundance to support a long-term and rewarding sport fishery.
–Wilderness Trout Streams: Wilderness trout stream management is based upon the provision of a wild trout fishing experience in a remote, natural, and unspoiled environment where man's disruptive activities are minimized.
–Wild Trout Streams: Stream sections supporting naturally reproducing populations of trout. A wild trout stream section is a biological designation that does not determine how it is managed; therefore, these streams may also be stocked with hatchery trout by the PFBC.
c/ Includes Kidder Compressor Station.
Key:
ATW = Approved Trout Waters (stocked with trout); EV = Exceptional Value; HQ = High Quality; PFBC = Pennsylvania Fish and Boat Commission; WTW = Wild Trout Waters/Streams; WWCW = Warm water/Cool water Fisheries
Source: PA Code, 2015; PFBC, 2015a-f; NHD, 2015.
Data is based on field delineated waterbodies and mapped waterbodies from NHD mapped features.

New Jersey

The Surface Water Quality Standards (SWQS), N.J.A.C. 7:9B, establish the designated uses and antidegradation categories of New Jersey's surface waters, classify surface waters based on those uses (i.e., stream classifications), and specify the water quality criteria and other policies and provisions necessary to attain those designated uses. Designated uses include drinking water supply, fish consumption, shellfish resources, propagation of fish and wildlife, recreation, and agricultural and industrial water supplies. Surface waters are classified based on the type of waterbody and the designated use of the waterbody. Freshwaters are classified as FW1 (not subject to any man-made wastewater discharges) and FW2 waters (all other freshwaters except Pinelands waters). Freshwaters are further classified based on trout status, trout production (FW2-TP), trout maintenance (FW2-TM), and non-trout (FW2-NT). Table 4.3.2-3 summarizes the water quality classifications and fishery designations of the waterbodies that would be crossed in New Jersey by the Project. Appendix G-8 provides water quality classifications and fishery designations for individual waterbody crossings in New Jersey by milepost as well as the proposed crossing method.

TABLE 4.3.2-3 Summary of New Jersey Water-Classified Designated Waterbodies Crossed by the Project						
Facility	NJDEP Water Quality Classification a/					
	FW2-NTC1	FW2-TMC1	FW2-TPC1	FW2-NTC2	FW2-NT	FW2-TM
PennEast Mainline	15	19	7	0	36	8
Gilbert Lateral	0	0	0	0	0	0
Lambertville Lateral	0	2	0	0	0	0

Note:
a/ Data is based on field delineated waterbodies and mapped waterbodies. New Jersey-classified designated waterbodies include Freshwater and Trout Designation Waters.
FW2-NTC1 = Freshwater, non-trout, C- 1
FW2-TMC1 = Freshwater , trout-maintenance, C-1
FW2-TPC1 = Freshwater, trout-production, C- 1
FW2-NTC2 = Freshwater, non-trout ,C-2
FW2-NT = Freshwater, non-trout
FW2-TM = Freshwater , trout-maintenance
Source: NHD 2015; NJDEP 2014a.

Category one (C-1) waters are classified as waters to be maintained based on their clarity, color, scenic setting, and other characteristics of aesthetic value, exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, or exceptional fisheries resources (NJDEP 2015b). According to New Jersey Surface Water Quality Standards, water quality within C-1 designated waters shall be protected from any measurable changes in order to protect the aesthetic and ecological attributes of the waterbody. Appendix G 9 identifies C-1 water that would be crossed by the Project. The dominant crossing method for these waters are proposed to use dry crossing methods with timing restrictions to correlate to critical periods for migratory fish passage or recreational uses.

We believe that construction following the measures included in our Procedures would adequately minimize impact on Pennsylvania and New Jersey state-designated waters, including HQ, EV, and C-1 streams. However, we have received numerous comments concerning impact on HQ and EV waters, including from the townships of Kingwood and Lower Saucon and several other organizations, and C-1 streams, including from the townships of Ewing, Holland, and Hopewell, as well as other organizations. Therefore, **we recommend that:**

- **Prior to the end of the draft EIS comment period, PennEast should file with the Secretary documentation to identify any special construction procedures that would be implemented to minimize impacts on C-1 streams. PennEast should provide documentation of consultation with appropriate federal and state agencies regarding C-1 streams, including identification of any agency recommendations and PennEast's responses.**

Waters Containing Federally or State-listed Threatened or Endangered Species or Critical Habitat

The Delaware River has been identified by FWS and PFBC as supporting species federally listed as threatened, endangered, or species of concern. These species included the dwarf wedgemussel (*Alasmidonta heterodon*), Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), and shortnose sturgeon (*Acipenser brevirostrum*). Assessment of impact on these species are addressed in section 4.3.3.

Waterbodies with Potable Water Intakes

PennEast identified surface water intake structures within 3 miles downstream of waterbody crossings using publicly available GIS data (PADCNR 2015c; NJDEP 2015b). These waterbodies and corresponding intake structures are identified in table 4.3.2-4.

TABLE 4.3.2-4

Waterbodies Within Three Miles Downstream of Potable Water Intake Structures

Waterbody Name	Waterbody ID	Milepost	Distance to Intake Structure a/	Intake Type	Primary Water Use of Intake b/
Pennsylvania					
Trout Brook	092414_GO_1001_P_IM	0.6	0.9	Groundwater	Industrial
UNT to Abraham Creek	111814_JC_1002_E_MI	4.3	1.3	Surface	Mineral Use
UNT to Susquehanna River	092414_GO_1003_P_IM	6.3	0.4	Surface	Agricultural
Gardner Creek	PA-NHD-015	9.8	1.3	Surface	Mineral Use
Stony Creek	042315_JC_1003_P_IN	34.7	1.0	Groundwater	Mineral Use
UNT to Hunter Creek	051115_JC_1002_P_MI	45.1	2.9	Groundwater, Surface	Mineral Use
UNT to Hunter Creek	051115_JC_1001_P_MI	45.6	2.5	Groundwater, Surface	Mineral Use
Buckwha Creek	090914_WA_1000_P_IM	48.1	0.8	Groundwater, Surface	Mineral Use
Aquashicola Creek	072215_JC_1001_P_IM	49.2	0.8	Surface	Commercial
UNT to Monocacy Creek	090314_DB_1011_E_MI	59.0	2.4	Groundwater	Industrial
UNT to Monocacy Creek	090414_DB_1012_I_MI	59.2	2.2	Groundwater	Industrial
UNT to Monocacy Creek	090414_DB_1013_I_MI	59.2	2.2	Groundwater	Industrial
Monocacy Creek	061215_JC_1005_P_IN	60.3	1.2	Groundwater	Industrial
UNT to Monocacy Creek	090315_DB_1005_E_MI	60.6	1.1	Groundwater	Industrial
UNT to Monocacy Creek	090314_DB_1007_E_MI	60.6	1.1	Groundwater	Industrial
UNT to Monocacy Creek	090314_DB_1006_I_MI	60.7	1.1	Groundwater	Industrial
UNT to Monocacy Creek	PA-NHD-098	66.9	2.5	Groundwater	Industrial
Delaware Canal	052915_JC_1002_C_IN	77.6	1.2	Surface	Agricultural
Delaware River	051415_SQ_1001_P_MA	77.6	1.2	Surface	Agricultural
Hellertown Lateral – Pennsylvania					
None					
New Jersey					
Delaware Canal	052915_JC_1002_C_IN	77.6	1.2	Surface	Agricultural
Delaware River	051415_SQ_1001_P_MA	77.6	1.2	Surface	Agricultural
UNT to Delaware River	NJ-NHD-130	80.0	2.3	Surface	Mineral Use
UNT to Delaware River	NJ-NHD-131	80.2	2.4	Surface	Mineral Use
UNT to Delaware River	NJ-NHD-216	80.4	1.8	Surface	Mineral Use
UNT to Delaware River	NJ-NHD-218	80.7	1.5	Surface	Mineral Use
UNT to Delaware River	NJ-NHD-132	80.8	1.4	Surface	Mineral Use

TABLE 4.3.2-4 Waterbodies Within Three Miles Downstream of Potable Water Intake Structures					
Waterbody Name	**Waterbody ID**	**Milepost**	**Distance to Intake Structure a/**	**Intake Type**	**Primary Water Use of Intake b/**
UNT to Delaware River	NJ-NHD-216	80.8	1.3	Surface	Mineral Use
UNT to Delaware River	NJ-NHD-134	81.5	1.2	Surface	Mineral Use
UNT to Delaware River	052015_JC_1001_E_MI	82.0	0.9	Surface	Mineral Use
Milford Creek	NJ-NHD-138	82.3	0.9	Groundwater	PCWSW
UNT to Milford Creek	NJ-NHD-140	82.7	0.7	Groundwater	PCWSW
Hakihokake Creek	NJ-NHD-141	83.2	0.6	Groundwater	PCWSW
UNT to Delaware River	NJ-NHD-225	84.8	1.4	Groundwater, Surface	Mineral Use
UNT to Harihokake Creek	NJ-NHD-232	85.3	2.4	Groundwater	Industrial
Harihokake Creek	NJ-NHD-240	85.6	2.3	Groundwater	Industrial
UNT to Harihokake Creek	NJ-NHD-245	85.8	2.2	Groundwater	Industrial
Harihokake Creek	NJ-NHD-149	86.3	1.5	Groundwater	Industrial
UNT to Hakihokake Creek	091014_WA_1004_I_MI	85.9	1.2	Groundwater	Industrial
UNT to Hakihokake Creek	091014_WA_1015_E_MI	86.0	1.1	Groundwater	Industrial
Harihokake Creek	NJ-NHD-043	86.7	0.4	Groundwater	Industrial
Nishisakawick Creek	091114_WA_1001_P_IM	87.7	0.9	Groundwater	PCWSW
UNT to Nishisakawick Creek	051515_SQ_1002_P_IN	87.8	1.0	Groundwater	PCWSW
Little Nishisakawick Creek	091114_WA_1005_I_IM	88.4	1.2	Groundwater	PCWSW
UNT to Little Nishisakawick Creek	091114_WA_1003_I_MI	88.8	1.1	Groundwater	PCWSW
UNT to Moores Creek	060315_SQ_1005_P_MI	105.2	0.9	Groundwater	PCWSW
Moores Creek	060415_SQ_1002_P_IN	105.7	1.1	Groundwater	PCWSW
UNT to Moores Creek	060415_SQ_1005_P_MI	105.9	1.3	Groundwater	PCWSW
Gilbert Lateral – New Jersey					
None					
Lambertville Lateral – New Jersey					
None					

Notes:
a/ There may be multiple intake structures within 3 miles downstream of a crossing, closest structure is noted.
b/ PCWSW = Public Community Water Supply Well; may contain more than one well at any given location
Sources: PADNCR 2015c; NJDEP 2015b; eMapPA v 4.0

Impaired Surface Waters and Waterbodies with Contaminated Sediments

Section 303(d) of the federal CWA mandates that states must prepare a list of all waters that do not meet the water quality criteria for their designated uses. These include the identification of the specific pollutant or water quality impairment (i.e., biological, chemical, or physical) not being attained and for develop a TMDL for each criterion. A TMDL establishes the maximum allowable discharge into a waterbody to better control the identified pollutants. The summary of the integrated reports prepared for each state (NJDEP 2015c; PADEP 2014) crossed by the Project and associated fish consumption advisories were used to identify impaired waters crossed by the Project.

Table 4.3.2-5 lists the identified impaired waterbodies in Pennsylvania. The Susquehanna River has water quality impairment related to metals and a fish consumption advisory for PCBs. The proposed pipeline installation method is via dry crossing using coffer dams and pump and flume thereby minimizing in water resuspension of contaminated sediments in the water column during construction. PennEast has not conducted testing to determine if PCBs are in the sediment at the specific crossing locations.

TABLE 4.3.2-5

Impaired Waterbodies or Waterbodies with Contaminated Sediments Crossed by Pipeline Facilities

Waterbody	MP	Impaired Designated Use(s) - 305(b) List	Pollutant(s) - 303(d) List	Water Quality Management Plan	Crossing Length (feet)	Pipeline Crossing Method
Pennsylvania						
Susquehanna River	7.0	Aquatic Life, Fish Consumption	Source Unknown -Mercury, AMD -Metals, Source Unknown -PCB	TMDL, 2002 (pH, siltation, metals)	1,056	Dry Crossing
Gardner Creek	9.8	Aquatic Life	AMD- pH, Urban Runoff/Storm Sewers-Water/Flow Variability	No known plan	56	Dry Crossing
Wild Creek/Beltzville Lake	43.5	Fish Consumption	Mercury	No known plan	164	HDD
Pohopoco Creek/Beltzville Lake	44.0	Fish Consumption	Mercury	No known plan	388	HDD
East Branch Monocacy Creek	61.4	Aquatic Life	Crop Related Agriculture - Siltation	TMDL, 2006 (siltation)	24	Dry Crossing
Lehigh River	71.1	Aquatic Life, Fish Consumption	Municipal Point Source - Organic enrichment/low DO, Urban runoff/Storm Sewers - Siltation, Source Unknown - PCB, Combined Sewer Overflow - Suspended Solids	TMDL, 2008 (PCB, metals, suspended solids, enrichment/low DO, siltation)	305	HDD
Frys (Frya)a Run	74.6	Recreation	Source Unknown - Pathogens	TMDL, 2010 (Pathogens)	15	Dry Crossing
Delaware River	77.6	Fish Consumption	Source Unknown – Mercury	No known plan	278	HDD
New Jersey						
Harihokake Creek	83.2	Aquatic Life – Trout, Recreation	Pathogens, Nutrients	TMDL, 2012 (Temperature metals)	45	Bore
Harihokake Creek	85.6	Aquatic Life, Aquatic Life – Trout, Recreation	Pathogens, Nutrients	TMDL, 2006 (Pathogens, nutrients)	92	Dry Crossing
Harihokake Creek	86.3	Aquatic Life, Aquatic Life – Trout, Recreation	Pathogens, Nutrients	TMDL, 2006 (Pathogens, nutrients)	66	Dry Crossing

TABLE 4.3.2-5 Impaired Waterbodies or Waterbodies with Contaminated Sediments Crossed by Pipeline Facilities						
Waterbody	**MP**	**Impaired Designated Use(s) - 305(b) List**	**Pollutant(s) - 303(d) List**	**Water Quality Management Plan**	**Crossing Length (feet)**	**Pipeline Crossing Method**
Nishisakawick Creek	87.7	Recreation	Pathogens, pH, Acidity, Caustic Conditions	TMDL, 2006 (Pathogens)	59	Bore
Copper Creek (Kingwood Twp)	90.0	Aquatic Life, Recreation	Pathogens, Nutrients	TMDL, 2006 (Pathogens, nutrients)	36	Dry Crossing
Lockatong Creek	91.6	Aquatic Life, Aquatic Life – Trout, Industrial Water Supply, Recreation, Public Water Supply	Pathogens, Nutrients, Temperature, Turbidity, pH, Acidity, Caustic Conditions	TMDL, 2006 (Pathogens, nutrients, pH)	248	HDD
Lockatong Creek	92.2	Aquatic Life, Aquatic Life – Trout, Industrial Water Supply, Recreation, Public Water Supply	Pathogens, Nutrients, Temperature, Turbidity, pH, Acidity, Caustic Conditions	TMDL, 2006 (Pathogens, nutrients, pH)	43	HDD
Lockatong Creek	92.4	Aquatic Life, Aquatic Life – Trout, Industrial Water Supply, Recreation, Public Water Supply	Pathogens, Nutrients, Temperature, Turbidity, pH, Acidity, Caustic Conditions	TMDL, 2006 (Pathogens, nutrients, pH)	110	HDD
Wickecheoke Creek	96.8	Aquatic Life, Aquatic Life – Trout, Recreation,	Pathogens, Nutrients, Temperature, pH, Acidity, Caustic Conditions	TMDL, 2006 (Pathogens, nutrients)	71	Dry Crossing
Alexauken Creek	100.4	Aquatic Life, Aquatic Life – Trout, Recreation, Public Water Supply	Temperature	TMDL, 2006 (Pathogens, pH, temperature, metals)	50	Dry Crossing
Jacobs Creek	109.1	Aquatic Life, Fish consumption, Recreation, Public Water Supply	Metals, Turbidity, Organic Enrichment/Oxygen Depletion, Pathogens, Mercury, Nutrients	TMDL, 2006 (DO, pathogens, metals, TSS, mercury)	18	Dry Crossing

Key:
No impaired waterbodies would be crossed by the Hellertown, Gilbert, or Lambertville laterals.
DO = Dissolved Oxygen
PCB = Polychlorinated biphenyls
UNT = Unnamed tributary
AMD = Abandoned mine drainage

The Lehigh River has impairment issues for aquatic life related to total suspended solids (TSS), low dissolved oxygen (DO), and siltation (PADEP, 2014). The proposed crossing method for the Lehigh River/Lehigh Canal at MPs 60.9-71.1 is HDD, therefore no in water work would be conducted and disturb sediments or impair water quality during construction. A fish consumption advisory is also in place for the river for PCBs. It is unknown if elevated concentrations of PCBs are present at the crossing locations. However, HDD installation of the pipeline would avoid disturbance of river sediments and avoid suspension of sediments in the channel and not introduce sediment contaminants into the water column.

Abandoned mine drainage (AMD) is a potential source of contaminated sediments within impaired waterbodies. Four waterbody crossings have sediment-related impairment issues related to the presence of metals which are potentially from AMD, including Gardner Creek, Susquehanna River, and Lehigh River (crossed twice). Gardner Creek has water quality issues related to pH due to AMD and non-point source contaminants. PennEast proposes to cross Gardner Creek using a dry crossing method. Utilization of this method would minimize in-water disturbance of sediments that may contain contaminants related to AMD or non-point sources.

The East Branch of Monocacy Creek is impaired by excessive siltation from agricultural lands and sources within its basin (PADEP 2014). PennEast proposes to cross Monocacy Creek by horizontal bore which would avoid direct disturbance of the creek sediments and would not result in the introduction of eroded soils or suspension of sediments during construction. Frya Creek is impaired due to exceedance of pathogenic organisms (coliform bacteria). The source for these pathogens is unknown. PennEast proposes to cross Frya Creek by dry crossing which would minimize in-water work and disturbance of sediments and would not contribute to an increase or other change in pathogenic organisms in the water.

Two waterbodies, Pohopoco Creek and Delaware River, have fish consumption advisories related to PCBs (Pohopoco Creek) and mercury (Delaware River) (PADEP 2014). PennEast proposes to use HDD construction methods for both crossings, which would avoid direct disturbance to the waterbodies and sediments, and would avoid suspension of sediments in these waterbodies during construction.

Based on the Section 303(d) lists, six waterbodies in New Jersey that would be crossed by the Project have water quality-related impairment issues related to pathogens and nutrients, and three waterbodies have water quality-related impairment issues related to pH, acidity, turbidity, and/or temperature (table 4.3.2-5). All of the listed waters identified in New Jersey are proposed for dry crossings using coffer dams, pump and flume, or flow diversion methods which would minimize in-water work and disturbance of sediments. Only Jacobs Creek has a potential issue for fish consumption for mercury in the water column. The source for the mercury was tentatively identified as air borne emissions (EPA 2010). Disturbance of sediments during the dry crossing of Jacobs Creek would not be expected to alter mercury bioavailability. PennEast has stated that HDD may be an alternative method for crossing impaired waters if water quality impairments may be further affected by dry crossing construction methods. Because the crossing method for all impaired waters has yet to be finalized, **we recommend that:**

- **<u>Prior to the end of the draft EIS comment period</u>, PennEast should file with the Secretary proposed crossing methods for all waterbodies, including those with contaminated sediments. The proposed method should ensure that the potential suspension of sediments during construction should be avoided or minimized to the greatest extent possible so as not to change bioavailability of any potential contaminants present. PennEast should include documentation of consultation with pertinent agencies and identify any recommended minimization measures.**

Waterbodies with Total Maximum Daily Load Plans

TMDL plans are available for fifteen of the nineteen impaired waterbody crossings in Pennsylvania (table 4.3.2-5). All five waterbodies have siltation or suspended solids listed as contributing to the impaired uses identified.

TMDL plans are available for all 11 of the New Jersey waterbody crossings with water quality impairments or issues related to contaminated sediments (table 4.3.2-5). All of the waterbodies listed have multiple stressors listed as being present in various reaches. Jacobs Creek also has total suspended solids listed as a source of impairment. Nutrients (i.e., phosphorus, nitrogen, etc.) were also listed for the waterbodies listed.

The installation of the pipeline using dry crossing methods may cause temporary localized increases in suspended solids during construction that could contribute to the current impairment from siltation. Nutrient releases via localized disturbance of soils may occur, but given the small footprint of disturbance and short-term duration of construction at individual crossings, it is not considered a long-term contribution to the watershed basin issue. Implementation of measures from PennEast's E&SCP and our Procedures would minimize soil erosion and suspended sediments to the extent practical at the crossing locations. Operation of the pipeline would not result in a long-term contribution of suspended solids to these waterbodies. Use of HDD would not result in resuspension sediments or soil erosion from excavation activities.

Waterbodies of Ecological or Recreational Importance

Waterbodies of ecological or recreational importance in Pennsylvania and New Jersey are designated under state regulations (Pennsylvania Code Chapter 93. Water Quality Standards; New Jersey Surface Water Quality Standards, N.J.A.C. 7:9B). The Project would cross waterbodies of ecological and recreational importance, which include High Quality and Exceptional Value streams in Pennsylvania, and Freshwater, Trout Maintenance, and Category 1 waterbodies in New Jersey. These waters are identified in appendix G-7, G-8, and G-9 and described above.

As stated above, PennEast would use a variety of methods to cross waterbodies of ecological or recreational importance based on crossing lengths. PennEast indicates that final crossing methods would be reassessed based on timing restrictions or selection of methods that lessen impact overall. The method would be determined on a case-by-case basis, based on site conditions at each crossing.

Waterbodies with Steep and Actively Eroding Banks and Riparian Areas

PennEast identified approximately 163 areas along the proposed pipeline, totaling 5.9 miles in length, of slopes greater than 30 percent within 200 feet of waterbody crossings, some of which are located adjacent to waterbodies. Measures included in the PennEast's E&SCP and our Plan and Procedures are designed to prevent or minimize erosion along slopes, including steep slopes adjacent to waterbody crossings. PennEast also states it would assess bank conditions of waterbodies on a case-by-case basis. Because surveys have not been completed, **we recommend that:**

- **Prior to construction, PennEast should file a revised E&SCP with the Secretary for review and written approval by the Director of the OEP, and PennEast should complete its review of waterbody crossings with steep slopes and modify its Project-specific E&SCP as necessary to address waterbody crossing methods for steep embankments and bank stabilization issues, and include measures to address erosion, sedimentation, and restoration of steep embankments.**

Waterbodies with Riparian Areas

Riparian areas are regulated in both Pennsylvania and New Jersey for aquatic and wetland resources. PennEast would obtain and comply with the applicable Pennsylvania and New Jersey permits (i.e., wetland and floodplain/flood hazard assessment permits) required to authorize these disturbances. In addition, PennEast would implement its E&SCP, a Post-Construction Stormwater Management Plan, and an SPCC Plan throughout the Project that would further minimize risks from spills or leaks, erosion and sedimentation, and stormwater runoff from construction areas with exposed soils. We have reviewed these plans and find them acceptable.

Flood Hazard Zones

The Federal Emergency Management Agency (FEMA) identifies areas subject to flooding and high-volume flows identified as Special Flood Hazard Areas which are located within the 100-year floodplain. The Project mainline would cross 4.5 miles of FEMA Special Flood Hazard Areas, including 2.6 miles in Pennsylvania and 1.7 miles in New Jersey. The laterals would not cross any FEMA Special Flood Hazard Areas. In addition, the pipeline route would cross regulated flood hazard areas consisting of floodways and flood fringes of waters regulated under the New Jersey Flood Hazard Area Control Act Rules at N.J.A.C. 7:13. No tidally influenced waterbodies would be located within the Project area.

No aboveground facilities would be located within a FEMA Special Flood Hazard Area.

4.3.2.3 Major Waterbodies Crossed by the Project

In Pennsylvania, major waterbody crossings include the Susquehanna River, Little Shades Creek, Lehigh River/Lehigh Canal (at two locations, although the Lehigh Canal would only be crossed at the second location), Wild Creek/Beltzville Lake, and Pohopoco Creek/Beltzville. The Project would cross the Delaware River/Delaware Canal, a major waterbody along the border of Pennsylvania and New Jersey. In New Jersey, major waterbody crossings include the Lockatong Creek (at two locations), an unnamed water, and Woolsey Brook UNT (table 4.3.2-6).

Susquehanna River

PennEast proposes to use a dry crossing to cross the Susquehanna River at MP 7.0. As discussed in section 4.3.2.2, the Susquehanna River has water quality impairment related to metals and a fish consumption advisory for PCBs. The proposed pipeline installation method is via dry crossing using coffer dams and pump and flume thereby minimizing in water resuspension of contaminated sediments in the water column during construction. Additionally, sediment-related impairment issues regarding the Susquehanna River are related to the presence of metals which are potentially caused by AMD.

TABLE 4.3.2-6 Major Waterbody Crossings by Milepost			
Waterbody	Milepost	Crossing Length (feet)	Crossing Method
PennEast Mainline - Pennsylvania			
Susquehanna River	7.0	1,056	Dry Crossing
Little Shades Creek	18.3	105	Dry Crossing
Lehigh River	23.0	444	Dry Crossing
Wild Creek/Beltzville Lake a/	43.5	164	HDD
Pohopoco Creek/Beltzville Lake a/	44.0	388	HDD
Lehigh River/Lehigh Canal	71.1	305	HDD
PennEast Mainline – New Jersey			
Delaware River/Delaware Canal	77.6	481	HDD
Lockatong Creek b/	91.6	248	HDD
Lockatong Creek b/	92.4	110	HDD
UNW	95.3	110	Dry Crossing
Woolsey Brook UNT c/	110.8	164	HDD

Notes:
HDD = Horizontal Direction Drilling; UNW = Unnamed Water
a/ Wild Creek/Pohopoco Stream (Beltzville Lake) would be crossed with one HDD (see table 2.3.1-1).
b/ Two portions of Lockatong Creek would be crossed with one HDD (see table 2.3.1-1).
c/ The HDD for Woolsey Brook UNT is referred to as Washington Crossing Pennington Road (see table 2.3.1-1).

Little Shades Creek

PennEast proposes to use a dry crossing to cross Little Shades Creek at MP 18.3. Little Shades Creek does not have any associated water impairment issues or state designations at the proposed crossing location.

Lehigh River

PennEast proposes to cross the Lehigh River twice (MPs 23.0 and 71.1; the second crossing is discussed below). The first crossing, at MP 23.0, would use a dry crossing method. As discussed in section 4.3.2.2, this crossing would be located within a mile upstream of a segment of the Lehigh River which is designated on the NRI for an outstandingly remarkable value for recreation and geology (NPS 2015), and this segment is designated as Pennsylvania Scenic River.

Wild Creek/Pohopoco Creek (Beltzville Lake)

PennEast proposes to use a HDD to cross Wild Creek/Pohopoco Creek (Beltzville Lake) at MP 43.5. The HDD would be about 6,100 feet long (see table 2.3.1-1). Construction procedures for the HDD method are discussed in section 2.3.1. As discussed in section 4.3.2.2, Wild Creek and Pohopoco Creek have fish consumption advisories related to mercury (see table 4.3.2-5); however, no in water work would be conducted and disturbance of sediments or impairment of water quality during construction would not be expected. See section 4.7.5.1 for discussion of the Section 408 approval process for crossing USACE-owned parcels (Beltzville Lake).

Lehigh River/Lehigh Canal

PennEast proposes to cross the Lehigh River twice (MPs 23.0 and 71.1; the first crossing is discussed above). The second crossing, at MP 71.1, would use a HDD. The HDD would be about 4,100 feet long (see table 2.3.1-1) and would encompass both the Lehigh River and the Lehigh Canal. Construction procedures for the HDD method are discussed in section 2.3.1. As discussed in section 4.3.2.2, at MP 71.1, the Lehigh River has impairment issues for aquatic life related to TSS, low DO, and siltation (see table 4.3.2-5); however, no in water work would be conducted and disturbance of sediments or impairment of water quality during construction would not be expected. Sediment-related impairment issues regarding the Lehigh River are related to the presence of metals which are potentially caused by AMD.

Delaware River/Delaware Canal

PennEast proposes to use a HDD to cross the Delaware River and Delaware Canal at MP 77.6. The HDD would be about 2,835 feet long (see table 2.3.1-1). Construction procedures for the HDD method are discussed in section 2.3.1. As discussed in Section 4.3.2.2, the proposed crossing is about nine miles south (downstream), and about two miles north (upstream) of portions of the Delaware River that are designated as National Wild and Scenic. The Delaware River has been identified by FWS and PFBC as supporting species federally listed as threatened, endangered, or species of concern, and the Delaware River are important routes for a number of migratory fish. To minimize impacts on these anadromous species, NOAA Fisheries requires the avoidance of in-water work in the Delaware River between March 1 and June 30. Additionally, the Delaware River has fish consumption advisories related to mercury (see table 4.3.2-5); however, no in water work would be conducted and disturbance of sediments or impairment of water quality during construction would not be expected.

Lockatong Creek

PennEast proposes to use a HDD to cross Lockatong Creek at MP 91.6. The HDD would be about 6,300 feet long (see table 2.3.1-1) and would cross Lockatong Creek twice with one HDD. Construction procedures for the HDD method are discussed in section 2.3.1. As discussed in section 4.3.2.2, Lockatong Creek has been identified as an impaired waterbody or waterbody with contaminated sediments (see table 4.3.2-5); however, no in water work would be conducted and disturbance of sediments or impairment of water quality during construction would not be expected.

UNW

PennEast proposes to cross an unnamed waterbody at MP 95.3 using a dry crossing method. This unnamed waterbody does not have any associated water impairment issues or state designations at the proposed crossing location.

Woolsey Brook UNT

PennEast proposes to use a HDD to cross Woolsey Brook UNT at MP 110.8. The HDD would be about 2,575 feet long (see table 2.3.1-1; HDD is referred to as Washington Crossing Pennington Road). Woolsey Brook UNT does not have any associated water impairment issues or state designations at the proposed crossing location. No in water work would be conducted and disturbance of sediments or impairment of water quality during construction would not be expected.

4.3.2.4 Waterbody Construction Procedures

As described above, the Project would cross 255 waterbodies consisting of 187 minor waterbody crossings, 57 intermediate waterbody crossings, and 11 major waterbody crossings. Special construction procedures for waterbody crossings are discussed in section 2.3.1.2 and additional details regarding the HDD method are provided below. Beltzville Lake, the Lehigh River/Lehigh Canal[16], the Delaware River, Lockatong Creek, and Woolsey Brook UNT would be crossed using the HDD method. PennEast proposed to cross waterbodies using a variety of methods including of HDD, bores, and dry-crossing methods. The crossing methods for the remaining waterbodies are provided in appendices G-5 and G-6. Factors in HDD design include: the availability of a straight and relatively low relief laydown area for the pullback pipe section; the availability of large work areas at the HDD entry and exit points; surrounding terrain; land use; and operation concerns. Based on information from PennEast, our review of Project mapping, and information we obtained during visits to the Project area, we conclude that the use of the HDD method at the every waterbody crossing would be either technically infeasible, impractical, or would not result in a clear environmental advantage to the proposed dry crossing methods.

Horizontal Directional Drilling

PennEast proposes to utilize the HDD method for 11 crossings along the pipeline route, five of which would involve waterbody crossings (see table 2.3.1-1). If a HDD in its proposed location proves unsuccessful, PennEast would be required to identify a new location for the crossing or new methodology, and request approval for the new location or methodology with all applicable agencies. PennEast has developed a HDD Inadvertent Returns and Contingency Plan which establishes operational procedures and responsibilities for the prevention, containment, and clean-up of inadvertent releases associated with the proposed directional drilling on the Project.

For each waterbody that would be crossed using the HDD method, PennEast would prepare site-specific plans that would include:

- site-specific construction diagrams that show the location of mud pits, pipe assembly areas, and all areas to be disturbed or cleared for construction;
- justification that disturbed areas are limited to the minimum needed to construct the crossing;
- identification of any aboveground disturbance or clearing between the HDD entry and exit workspaces during construction;
- description of how an inadvertent release of drilling mud would be contained and cleaned up; and
- a contingency plan for crossing the waterbody or wetland in the event the HDD is unsuccessful and how the abandoned drill hole would be sealed, if necessary.

[16] The Lehigh River would be crossed twice by the Project. The crossing at MP 23.0 would be a dry-crossing; however, the crossing at MPs 70.9-71.1 would be for both the Lehigh River and the Lehigh Canal and would be completed via HDD.

We have reviewed this plan and find it adequate.

Hydrostatic Test Water

Hydrostatic testing would be completed on all pipeline segments prior to placing the pipeline into service. Water from surface water sources or municipal sources would be used to conduct the hydrostatic testing. No chemicals (i.e., biocide or corrosion inhibiting agents) would be added to hydrostatic test waters to be discharged. Withdrawal and discharge of hydrostatic test waters would be regulated through state-issued and DRBC water withdrawal permits, as required, as well as state pollutant discharge elimination system (SPDES) discharge permits, as administered by Pennsylvania, New Jersey and the DRBC (as applicable).

Preliminary water sources, withdrawal and discharge volumes, and milepost locations for withdrawal and discharge sites are presented in table 4.3.2-7. In total, PennEast anticipates using approximately 18 million gallons of water for hydrostatic testing. To minimize the entrainment of organisms from surface waterbodies during water withdrawal, mesh screened intake hoses would be used. Adequate flow rates downstream from the withdrawal would be maintained to protect aquatic life, provide for waterbody designated uses, and provide for downstream withdrawals of water by existing users. During exceptional dry periods when low flow conditions may be encountered, the volume to be withdrawn would be assessed relative to the hydrological needs of the waterbody to determine if an alternative water source (i.e., municipal supply) should be used. State-designated EV or C-1 waters, waterbodies that provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies would not be used as hydrostatic text water withdrawal sources, unless the appropriate federal, state, and/or local permitting agencies have granted written permission.

Because PennEast has not identified the final hydrostatic test water sources and discharge locations, **we recommend that:**

- **<u>Prior to construction</u>, PennEast should file with the Secretary its final hydrostatic test plan that identifies the final hydrostatic test water sources and discharge locations, and provides documentation that all necessary permits and approvals have been obtained for withdrawal from each source. PennEast's plan should provide the approximate water volume that would be withdrawn and discharged as both a Project-total amount, and a daily amount, for each pipeline segment. Also, PennEast's plan should detail the decision process for determining when an alternative water source would be used during exceptional dry periods when low flow conditions may be encountered.**

Discharges of hydrostatic test water would be regulated by state SPDES permit, and the classification of the receiving waters (as applicable) would be identified as part of the permitting process. Hydrostatic test manifolds on discharges would be used to dissipate energy flow in aquatic waterbodies to minimize scouring in the receiving waterbody. Water would be prevented from discharging into state-designated exceptional value waters, waterbodies that provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies, unless otherwise approved by federal, state, and/or local permitting entities.

TABLE 4.3.2-7

Preliminary Hydrostatic Test Water Withdrawal and Discharge Locations

Preliminary Test Section Number	Start Milepost	End Milepost	Approx. Water Volume (Gallons)	Potential Sources	Approximate Source Location		Discharge Location
PennEast Mainline							
1	0.0	4.4	1,159,011	Jumper from Section 2	N/A		41°19'8.54"N 75°52'38.13"W
2	4.4	10.0	1,423,820	Hydrant 1 / Hydrant 2 / Hydrant 3 / Hydrant 4	41°17'18.82"N 41°17'23.96"N 41°16'29.62"N 41°15'45.26"N	75°47'47.94"W 75°47'40.67"W 75°47'60.00"W 75°46'55.07"W	41°16'38.67"N, 75°48'35.08"W
3	10.0	17.5	1,982,348	Jumper from Sections 1/2	N/A		N/A
4	17.5	21.5	1,048,725	Jumper from Section 5	N/A		N/A
5	21.5	26.4	1,265,527	Jumper from Section 6 / Lake Harmony / Big Boulder Lake	41° 3'49.65"N 41° 2'46.83"N	75°35'55.80"W 75°35'12.21"W	N/A
6	26.4	40.4	3,592,602	BWA Hydrant	40°53'49.06"N	75°33'37.45"W	N/A
7	40.4	46.2	1,512,894	Jumper from Section 7 / BWA Hydrant	40°53'49.06"N	75°33'37.45"W	N/A
8	46.2	46.3	28,130	Jumper from Section 7	N/A		N/A
9	46.3	47.8	380,155	Jumper from Section 7 / Blue Mountain Ski Resort	40°49'12.68"N	75°30'33.09"W	40°50'17.25"N 75°30'32.75"W
10	47.8	48.5	183,778	Jumper from Section 11 / Blue Mountain Ski Resort	40°49'12.68"N	75°30'33.09"W	N/A
11	48.5	51.0	640,202	Jumper from Section 12	N/A		40°48'17.95"N 75°31'44.53"W
12	51.0	54.2	831,577	Jumper from Section 15	N/A		40°47'19.42"N 75°28'42.59"W
13	54.2	55.1	230,473	Jumper from Section 15	N/A		40°47'12.11"N 75°27'45.28"W
14	55.1	59.1	1,039,472	Jumper from Section 15	N/A		N/A
15	59.1	65.7	1,679,901	Jumper from Section 18 / Hydrant 6 / Hydrant 7	40°44'5.09"N 40°43'59.18"N	75°23'38.64"W 75°23'1.05"W	N/A
16	65.7	67.7	522,344	Jumper from Section 17 Hydrant 9 / Hydrant 10	40°42'39.03"N 40°42'18.29"N	75°19'32.40"W 75°19'2.51"W	N/A

TABLE 4.3.2-7

Preliminary Hydrostatic Test Water Withdrawal and Discharge Locations

Preliminary Test Section Number	Start Milepost	End Milepost	Approx. Water Volume (Gallons)	Potential Sources	Approximate Source Location		Discharge Location
17	67.7	70.2	644,131	Jumper from Section 18 / Lehigh River / Hydrant 11	40°38'30.27"N 40°39'20.69"N	75°16'40.95"W 75°17'17.85"W	40°38'58.99"N 75°16'53.20"W
18	70.2	77.1	1,791,711	Delaware River / Hydrant 12	40°34'0.34"N 40°34'58.66"N	75° 9'26.19"W 75°11'22.13"W	40°35'4.30"N 75°11'55.39"W
19	77.1	87.2	2,332,758	Jumper from Section 23 / Delaware River / Hydrant 12	40°34'0.34"N 40°34'58.66"N	75° 9'26.19"W 75°11'22.13"W	40°33'4.08"N 75° 3'42.33"W
20	87.2	87.3	23,086	Jumper from Section 21	N/A		40°30'33.49"N 75° 2'14.59"W
21	87.3	90.6	862,732	Jumper from Section 23 / Hydrant 14 / Hydrant 15	40°31'54.00"N 40°31'49.18"N	75° 3'28.92"W 75° 3'31.15"W	40°30'26.16"N 75° 2'10.95"W
22	90.6	90.7	28,179	Jumper from Section 23	N/A		40°18'47.38"N 74°49'13.56"W
23	90.7	111.2	5,338,022	Jumper from Section 19	N/A		N/A
24	111.2	113.5	584,961	Jumper from Section 23 / Hydrant 17	40°18'32.97"N	74°48'46.49"W	40°18'24.29"N 74°47'4.15"W
25	113.5	115.0	344,473	Hydrant 18	40°18'25.88"N	74°46'53.50"W	40°18'56.44"N 74°46'9.11"W
Hellertown Lateral							
26	0.0	2.1	252,989	Lehigh River / Hydrant 11	40°38'30.27"N 40°39'20.69"N	75°16'40.95"W 75°17'17.85"W	40°36'31.91"N 75°17'57.63"W
Gilbert Lateral							
27	0.0	0.1	18,613	Delaware River / Hydrant 12	40°34'0.34"N 40°34'58.66"N	75° 9'26.19"W 75°11'22.13"W	40°34'11.33"N 75° 9'51.16"W
Lambertville Lateral							
28	0.0	1.4	405,394	Hydrant 16	40°22'56.00"N	74°56'4.61"W	40°24'4.46"N 74°54'46.47"W

4.3.2.5 General Impacts and Mitigation for Surface Water Resources

Pipeline construction activities that could potentially affect surface waters include clearing and grading of streambanks, in-stream trenching, blasting, trench dewatering, inadvertent returns from HDD operations, and potential spills or leaks of hazardous materials. Potential effects on surface waters may include:

- modification of aquatic habitat;
- increased runoff and the rate of in-stream sediment loading; turbidity;
- decreased DO concentrations;
- releases of chemical and nutrient pollutants from sediments; thermal effects;
- modification of riparian areas; and
- introduction of chemical contaminants such as fuel and lubricants.

In-stream construction activities, especially trenching and backfilling of the trench, would temporarily increase the amount of sediments mobilized downstream. The extent of the impact would depend on sediment loads, stream velocity, turbidity, bank composition, and sediment particle size. These factors would determine the density and downstream extent of sediment migration. In-stream construction could also result in the alteration of stream contours. Changes in the stream bottom contours could alter stream dynamics and increase downstream erosion or deposition. Turbidity resulting from resuspension of sediments from in-stream construction and erosion of cleared right-of-way areas could reduce light penetration and photosynthetic oxygen production. In-stream disturbance could also introduce chemical and nutrient pollutants from sediments. Resuspension of deposited organic material and inorganic sediments could cause an increase in biological and chemical use of oxygen, potentially resulting in a decrease of DO concentrations in the affected area. Lower DO concentrations could cause temporary displacement of motile organisms, such as fish, and may kill non-motile organisms within the affected area.

The clearing and grading of streambanks would reduce riparian vegetation and expose soil to erosional forces. The use of heavy equipment for construction could cause compaction of near surface soils, an effect that could result in increased runoff into surface waters in the immediate vicinity of the construction right-of-way. Increased surface runoff could transport sediment from uplands into surface waters, resulting in increased turbidity levels and increased sedimentation rates in the receiving waterbody. Disturbances to stream channels and streambanks could also increase the likelihood of scour after construction.

Refueling of vehicles and storage of fuel, oil, or other hazardous materials near surface waters could create a potential for contamination. If a spill were to occur, immediate downstream users of the water could experience degradation in water quality. Acute and chronic toxic effects on aquatic organisms could also result from such a spill.

Blasting may be required along the pipeline route and within waterbodies. In-stream blasting has the potential to injure or kill aquatic organisms, displace organisms during the blast-hole drilling operations, and temporarily increase stream turbidity. Chemical by-products from the blasting materials could also be released and could potentially contaminate the water.

Crossings employing HDD or conventional bore technologies would not be expected to impact TSS/total dissolved solids or turbidity levels in the open channel of waterbody and wetland areas being crossed using these technologies. Breakthrough of HDD drilling muds into the waterbody during drilling could also result in siltation or exceedance of water quality standards for TSS or turbidity. The Project E&SCP, SPCC Plans, HDD Inadvertent Returns and Contingency Plans, and HDD construction BMPs would be followed during HDD and conventional bore installation activities to minimize potential breakthrough events during HDD operations. HDD-related BMPs to be implemented by PennEast would include, but are not limited to, the following:

- ensure that all workers are properly trained and familiar with the necessary procedures for response to an inadvertent return, prior to commencement of drilling operations.
- all equipment and vehicles would be checked and maintained daily to prevent leaks of hazardous materials.
- spill kits and spill containment materials would be available on-site at all times. A vacuum truck would be readily available within 30 minutes of the site during all drilling operations. Containment materials (straw, silt fencing, sand bags, spill kits, etc.) would be staged on-site at location where they are readily available and easily mobilized for immediate use in the event of an inadvertent return.
- equipment required to contain and clean-up an inadvertent return would either be available at the work site or readily available at an offsite location within 30 minutes of the bore site.
- if equipment is required to be operated near riverbed, absorbent pads and plastic sheeting for placement beneath motorized equipment would be used to protect the riverbed from engine fluids.
- crew members would receive training in the provisions of applicable plans, equipment maintenance and site-specific permit and monitoring requirements; inspection procedures for release prevention and containment equipment and materials; contractor/crew obligation to immediately stop the drilling operation upon first evidence of the occurrence of an inadvertent return and to immediately report any release; operation of release prevention and control equipment and the location of release control materials, as necessary and appropriate; and protocols for communication with agency representatives who might be on-site during the clean-up effort.
- drilling fluid pressures would be closely monitored. Pressure observations would be compared to estimates of the required drilling fluid and allowable formation pressures. Actions would be taken to lower the required drilling fluid pressure where pressures differ greatly with expectations.
- an environmental inspector would be onsite monitoring the drill for inadvertent releases and ensuring proper erosion and sediment best management practices are in place and working.
- exit and entry pits would be enclosed by silt fences and straw. If necessary, barriers (straw bales or sedimentation fences) between the bore site and the edge of the water source would be constructed prior to drilling to prevent released bentonite material from reaching the water.

- water containing mud, silt, bentonite, or other pollutants from equipment washing or other activities would not be allowed to enter a lake, flowing stream or any other water source. The bentonite used in the drilling process would be either disposed of at an approved disposal facility or recycled in an approved manner. Other construction materials and wastes shall be recycled or disposed of as appropriate.

Minor impacts on water resources would include the reduction of shading along riparian areas through the conversion of forested riparian and wetland areas to herbaceous or emergent wetland areas. This reduction in shading would be limited to isolated areas of stream or tributary crossings and would allow for increased light penetration to the stream channel. This could lead to greater light penetration and increased temperatures in the water column during warmer seasons (i.e., late spring and summer) at these isolated locations. Increased light penetration may also enhance aquatic vegetation growth in the channels where the crossing occurred following construction. These impacts would largely be limited to smaller streams and tributaries crossed where pre-construction canopy coverage fully encloses the channel. Given that the maximum crossing width of the right-of-way is 50 feet, the small area of channel affected would not present a significant impact on overall aquatic system. Larger tributaries and rivers would not be as affected by this reduction in canopy cover as most of the channels would already have open channels at the crossing location. Crossings using HDD or boring technologies for pipeline installation would see reduced impacts from changes in riparian cover.

Final restoration of the crossing of waterbodies would maintain riparian buffers and canopy cover over surface waters to the extent practicable, maintain existing hydrology, and encourage natural thermal buffering. Direct discharges of stormwater runoff to surface waters would be minimized by thorough establishment of vegetative cover and implementation of PennEast's E&SCP. Utilization of BMPs in the E&SCP to encourage soil infiltration and promote groundwater recharge of stormwater runoff would act to prevent direct discharge to the waterbody being crossed.

Floodplain Crossings

Executive Order 11988, *Floodplain Management*, requires each federal agency to ensure that the potential effects of any action it may take in a floodplain are evaluated. None of the proposed aboveground facilities are in FEMA-designated floodplains. Floodplains that would be crossed by the pipeline could be temporarily affected by trenching and spoil piles. Creation of the trench would temporarily increase the flood retention capacity, but this would be offset by an equal reduction of flood retention capacity associated with the spoil piles, thus the overall flood retention capacity would be unchanged. However, the presence of the spoil piles would temporarily alter surface drainage and could redirect flows within the floodplain area. Floodplains would not be affected by the operation of the pipeline, which would be buried. Seasonal and flash flooding hazards are a potential concern where the pipeline would cross or be near major waterbodies and small watersheds. Although flooding itself does not generally present a risk to pipeline facilities, bank erosion and/or scour could expose the pipeline or cause sections of pipe to become unsupported. All pipeline facilities are required to be designed and constructed in accordance with 49 CFR 192. These regulations include specifications for installing the pipeline at a sufficient depth to avoid possible scour at waterbody crossings. Typically, the trench would be sufficiently deep to provide for a minimum of 5 feet of cover over the pipeline at waterbodies.

Blasting

If blasting in waterbodies is required, there is a potential for permanent alterations of stream channels. PennEast proposes to develop site-specific blasting plans for each waterbody crossing where blasting is determined to be necessary. If blasting is required, all blasting activity would be performed according to federal and state safety standards and in accordance with PennEast's comprehensive Blasting Plan to be implemented by a certified blasting contractor. PennEast would obtain blasting permits from appropriate agencies (see section 4.1.6 for additional information about blasting) and would conduct any required in-stream work during the appropriate timing window for warmwater and coldwater fisheries.

Hazardous Materials Spills

During construction, refueling and maintenance operations of heavy equipment would require the use of fuel, lubricants, coolant, welding materials, and hydraulic fluids. Accidental spills and leaks of hazardous materials associated with equipment trailers, the refueling or maintenance of vehicles, and the storage of fuel, oil, and other fluids can have immediate effects on aquatic resources and could contaminate waterbodies downstream of the release point. The Project SPCC Plan would be implemented to ensure that spill prevention and response protocols are followed to both minimize risk of environmental release and effects in the use of these materials.

Extra Workspace Within 50 Feet of Waterbodies

FERC Procedures require that ATWS be at least 50 feet away from wetland boundaries and waterbodies, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land. Appendix G-10 identifies wetland and waterbodies crossings that may require site-specific justification for ATWS within 50 feet of wetlands and waterbodies. PennEast has identified a total of 211 areas where ATWS would be required within 50 feet of wetlands and waterbodies. Based on our review, we have determined that PennEast has provided adequate justification for the majority of the requested ATWSs.

4.3.2.6 Conclusions

No long-term effects on surface waters are anticipated as a result of construction and operation of the Project. No designated water uses would be permanently affected because the pipeline would be buried beneath the bed of the waterbodies, erosion controls would be implemented during construction, and streambanks and streambed contours would be restored as close as possible to preconstruction conditions.

Operation of the Project would not result in any surface waters effects, unless maintenance activities involving pipe excavation and repair in or near streams are required. If this should occur, PennEast would employ protective measures similar to those proposed for construction of the Project. Consequently, we conclude that any maintenance-related effects would be short term.

4.3.3 Aquatic Resources

The Project would cross multiple waterbodies, including lakes, ponds, streams, and wetlands, potentially affecting aquatic resources during the installation and operation of the

Project. Installation would include subsurface burial of the pipeline and associated laterals of various widths using various methods (see section 2 and section 4.3.2).

4.3.3.1 Existing Aquatic Biological Resources

Aquatic biological resources include invertebrates and fish species that are reliant on aquatic habitats. The FWS, NOAA Fisheries, PFBC, Pennsylvania Game Commission (PGC), PADCNR, NJDEP- Endangered and Nongame Species Program (ENSP), and NJDEP-NHP were consulted to identify the game and non-game fish species that could occur in the Project area and to determine the appropriate classifications for waterbodies crossed by the proposed Project. Federal or State listed threatened and endangered aquatic species are discussed in section 4.6 of this EIS.

Existing Fisheries Resources

A list of common or representative fish species that may be found in waterbodies crossed by the pipeline were identified using data available from PFBC and NJDEP. Table 4.3.3-1 lists the fish species that are expected to occur in the waterbodies that would be crossed by the Project in Pennsylvania and New Jersey.

TABLE 4.3.3-1

Representative Fish Species in Waterbodies Crossed by the Project

Common Name	Scientific Name	Portion of Project (by State)
Warmwater Fish		
Largemouth bass	*Micropterus salmoides*	Pennsylvania and New Jersey
Smallmouth bass	*Micropterus dolomieu*	Pennsylvania and New Jersey
Rock bass	*Ambloplites rupestris*	Pennsylvania
Channel catfish	*Ictalurus punctatus*	Pennsylvania
Muskellunge	*Esox masquinongy*	Pennsylvania and New Jersey
Chain pickerel	*Esox niger*	Pennsylvania and New Jersey
Brown bullhead	*Ameiurus nebulosus*	New Jersey
Channel catfish	*Ictalurus punctatus*	New Jersey
Carp	*Cyprinus carpio*	New Jersey
Sauger	*Sander canadensis*	Pennsylvania
Northern pike	*Esox lucius*	Pennsylvania
Black crappie	*Pomoxis nigromaculatus*	Pennsylvania and New Jersey
White crappie	*Pomoxis annularis*	Pennsylvania and New Jersey
Bluegill	*Lepomis macrochirus*	Pennsylvania and New Jersey
Pumpkinseed	*Lepomis gibbosus*	Pennsylvania and New Jersey
Redbreast sunfish	*Lepomis auritus*	Pennsylvania and New Jersey
Northern pike	*Esox lucius*	New Jersey
White perch	*Morone americana*	Pennsylvania
White bass	*Morone chrysops*	Pennsylvania
Yellow perch	*Perca flavescens*	Pennsylvania and New Jersey
Walleye	*Sander vitreus*	Pennsylvania and New Jersey
Coldwater Fish		
Brown trout	*Salmo trutta*	Pennsylvania and New Jersey
Rainbow trout	*Oncorhynchus mykiss*	Pennsylvania and New Jersey

TABLE 4.3.3-1 Representative Fish Species in Waterbodies Crossed by the Project		
Common Name	**Scientific Name**	**Portion of Project (by State)**
Brook trout	*Salvelinus fontinalis*	Pennsylvania and New Jersey
Longnose dace	*Rhinichthys cataractae*	Pennsylvania and New Jersey
Eastern blacknose dace	*Rhinichthys atratulus*	Pennsylvania and New Jersey
Mottled sculpin	*Cottus bairdi*	Pennsylvania
Slimy sculpin	*Cottus cognatus*	Pennsylvania
Migratory Fish		
Striped bass	*Morone saxatilis*	Pennsylvania and New Jersey
American shad	*Alosa sapidissima*	Pennsylvania and New Jersey
American eel	*Anguilla rostrata*	Pennsylvania and New Jersey
Blueback herring	*Alosa aestivalis*	Pennsylvania and New Jersey
Alewife	*Alosa pseudoharengus*	Pennsylvania and New Jersey

Source: PFBC 2015a,b,c,d,e,f,g; and NJDEP 2005

Fisheries of Special Concern

Fisheries of Special Concern are waters considered by the state or federal agencies to have exceptional resource value. These fisheries support unique or rare aquatic species, host significant migratory fish populations, are associated with state or federal stocking programs, or are governed by state fishery management regulations. Specifically for Pennsylvania, these criteria include HQ waters, EV waters, wild trout waters, and trout stocked fisheries (TSF). In New Jersey, waters meeting these criteria include outstanding natural resource waters, FW-1, C-1, TP and TM waters. See tables 4.3.2-2 and 4.3.2-3 for Fisheries of Special Concern in Pennsylvania and New Jersey, respectively.

The tidal and non-tidal sections of the Delaware River are important migratory routes for a number of migratory species (NOAA Essential Fish Habitat Mapper v. 3.0). Within the Delaware River, NOAA Fisheries identified several anadromous fish species of concern that require a timing restriction associated with their spawning activities that require movement upstream (see Appendix H). To minimize impacts on these anadromous species, NOAA Fisheries requires the avoidance of in-water work in the Delaware River between March 1 and June 30. This timing restriction also applies to several tributaries of the Delaware River, as designated by NOAA Fisheries. These tributaries include the Delaware River Canal and Lehigh River in Pennsylvania, and Hakihokake Creek 1.6 kilometers upstream from the confluence with the Delaware River, Copper Creek, Lockatong Creek, Jacobs Creek and its unnamed tributaries, as well as Fiddlers Creek and its unnamed tributaries in New Jersey (see Appendix H). The anadromous species for which this restriction is applied include the striped bass, alewife, blueback herring and American shad. Also occurring within the Delaware River are the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and the shortnose sturgeon (*Acipenser brevirostrum*).

Essential Fish Habitat

Federally listed EFH, as defined under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), are comprised of federally listed waters that are essential to the long-term survival and health of our nation's marine fisheries. EFH can consist of both the water column and the underlying surface of a particular area. EFH includes those habitats that support the different life stages of each managed species to support breeding, spawning, nursery, feeding, and protection functions. EFH encompasses those habitats necessary to ensure healthy marine fisheries now and in the future. The NMFS has indicated that the proposed pipeline would not cross through or impact any identified EFH (see appendix H).

4.3.3.2 General Impacts and Mitigation

Construction of the pipeline could have both direct and indirect impacts on aquatic biological resources. In-stream pipeline construction could remove habitat, temporarily increase sedimentation and turbidity in the water column, increase the potential for streambank erosion, temporarily disturb streambed foraging areas, and temporarily increase the potential for fuel or chemical spills.

See section 2.3.1.2 and 4.3.2 for discussion of waterbody crossing methods and impacts.

Use of flume or dam-and-pump would be the primary crossing method used for most of the smaller waterbodies that have a perceptible flow at the time of construction. This is a method by which temporary diversion of the stream would occur. This diversion is typically accomplished through the use of a cofferdam or pump methods to divert flow and allow construction to occur under dry conditions across the natural streambed. In-stream work could result in short-term increase of suspended sediments in the stream channel during construction. These increases would be short-term in nature and would subside after construction is complete. The use of dry-crossing methods, as opposed to wet-crossing methods, would minimize in-water disturbance within the stream basin during excavation activities. Stockpiling of soils and stream cobbles would be done using methods consistent with PennEast's E&SCP to allow for reuse of the material for burial of the pipeline and stabilization of the streambed.

The HDD or conventional bore method would be used to cross some of the larger waterbodies (see table 2.3.1-1 in section 2, as well as section 4.3.2.4). These methods would be used to prevent in-water impacts on the aquatic resources of the waterbody. This would be accomplished by installing the main pipeline segment beneath the waterbody and prevent disturbance of bottom sediments (see section 2.3.1.2 for more details regarding the HDD and conventional bore methods). During HDD operations, the use of drilling fluids to advance the pipeline may result in breakthrough of pressurized drilling fluids into the water column and result in temporary increases in total suspended solids or turbidity. Should monitoring reveal that a breach of drilling fluids is occurring, the E&SCP would be implemented to minimize the environmental impacts on the stream being crossed.

Construction of the pipeline as well as the associated access roads across a waterbody has the potential to restrict the flow of water as well as the movement of aquatic organisms within the waterbody if the crossing is not constructed correctly. The use of pumps to maintain stream flow around the construction work areas during the conventional open-cut crossings could entrain or impinge fish and ichthyoplankton. This potential impact would be minimized by screening the intakes of the pumping system, as described in Project's E&SCP. However, some small fish and larvae as well as all forms of ichthyoplankton would still be subject to entrainment, although the duration of this effect would be short (i.e., 24 to 48 hours) and would cease when the crossing is completed and normal streamflow is restored. This short-term and localized interruption of fish passage is not anticipated to dramatically affect the migration of fish within the stream systems that would be crossed by the Project. The dam and pump crossing method could also result in sediment scour downstream of the crossing if measures were not implemented to dissipate the energy of the pump discharge. However, as described in the E&SCP, PennEast would direct all discharges from the pumps through energy dissipaters to minimize scour and downstream siltation.

Any impacts related to the flow of the waterbody would be temporary and limited to the construction phase of the Project as long as the pipeline is buried to sufficient depth (i.e., the pipe does not become exposed due to erosion of the streambed and become "perched" in the waterbody) and all access roads across streams are constructed so as to allow fish passage up and down-stream of the crossing (e.g., culverts are constructed properly and in compliance with state and federal requirements). In order to ensure that fish passage is maintained at any proposed new access roads across waterbodies that would be constructed, PennEast would be required to comply with all state and federal requirements related to culvert or bridge construction.

Some limited blasting could be required along the pipeline to increase the depth and width of trenches in order to accommodate the buried pipeline. Potential adverse effects of blasting in waterbodies could include direct mortality of organisms in the immediate vicinity of the blast. Blasting can also have some short-term adverse impacts, similar to trenching, including reduced macroinvertebrate prey base, alteration of substrate characteristics, and loss of large woody debris and structure (e.g., impacts on riparian areas). If blasting is required, all blasting activity would be performed according to federal and state safety standards and in accordance with PennEast's Blasting Plan to be implemented by a certified blasting contractor. PennEast would make every attempt to utilize non-blasting bedrock removal techniques whenever possible.

Impacts on riparian areas can affect aquatic organisms by increasing erosion and sedimentation input to the waterbody, reducing organic input (e.g., woody debris), and altering shade or cover habitats across waterbodies. Where forested riparian vegetation would be converted to herbaceous cover on the permanent right-of-way (see section 4.5), some thermal enhancement and light penetration of the stream channel could occur. This effect would be mostly associated with smaller stream crossings where forested canopies fully shade the channel prior to construction. Greater light penetration may lead to some avoidance of illuminated streambeds by fish due to enhanced risk from predation. These impacts would be considered permanent and would be part of the operational phase of the Project. Riparian buffers within Pennsylvania would be protected in accordance with Chapter 102 Riparian Buffer Rules (PA Code 025 Chapter 102.14) and permit conditions. Riparian buffers within New Jersey would be protected in accordance with Flood Hazard Area Control Act Rules (N.J.A.C. 7.13-10.2) and permit conditions. The protection of vegetated buffers around waterbodies, in accordance with state regulations, would help to minimize impacts on aquatic biological resources by preserving water quality and reducing potential for streambank erosion and increased sedimentation as well as turbidity in the water column.

Hydrostatic testing of the pipe following construction has the potential to impact both aquatic habitats as well as organisms. PennEast would be required to obtain state and federal permits to withdraw water from Waters of the U.S., and these permits would contain measures that would be required in order to minimize impacts on aquatic resources (e.g., restrictions on when and how much water can be withdraw, as well as how the water can be withdrawn and discharged). PennEast would be required to ensure that hydrostatic test water withdrawals and discharges would not result in a significant fish entrainment, loss of habitat, or an adverse effect to water quality. For non-municipal sources of hydrostatic test water, the withdrawal intake hoses would be fitted with intake screen devices that would minimize the risk of the entrainment of fingerling and small fish during water withdrawal. Discharge would comply with regulatory permit conditions and be controlled to prevent scour and sedimentation, flooding, or the introduction of foreign or toxic substances into the aquatic system. With these measures, the intake and discharge of water for hydrostatic testing would not significantly impact aquatic resources.

PennEast would comply with all waterbody crossing windows established by state and federal permit requirements. In accordance with the FERC Procedures, to minimize impact on fisheries resources, all in-stream work would be performed between June 1 and September 30 to protect CWF and between June 1 and November 30 to protect warm water fisheries, unless other more stringent agency timing restrictions would apply to the affected waterbody. For example in Pennsylvania, the timing restrictions specific to in-stream construction in trout streams encompass three sets of dates:

- October 31 through December 31 for wild trout streams;
- October 1 through April 1 for Class A wild trout streams; and
- March 1 through June 15 for approved trout waters and stocked trout streams.

Only the March 1 through June 15 instream restriction period for approved trout waters and stocked trout streams in Pennsylvania is more restrictive that the FERC Procedures for cold-water or warm-water fisheries. Additional timing restrictions would likely be developed as part of the Pennsylvania State Programmatic General Permit (PSPGP-5); PennEast would be required to adhere to any timing restrictions developed a part of the PSPGP-5.

In New Jersey, the timing restrictions specific to in-stream construction in waterbodies encompass five sets of dates:

- March 15 through June 15 for trout maintenance waters;
- May 1 through June 30 for non-trout waters;
- September 15 through March 15 for trout production waters;
- May 15 through July 15 for wood turtle nesting; and
- November 15 through March 15 for wood turtle hibernation.

All of these restriction periods with the exception of the wood turtle hibernation period are more restrictive than the FERC Procedures for coldwater or warmwater fisheries. The PennEast proposed work schedule for this Project currently does not identify all potential applicable in-water timing restrictions by waterbody; therefore, **we recommend that**:

- **<u>Prior to construction</u>, PennEast should file with the Secretary documentation after consulting with appropriate local, state, and federal agencies regarding any in-water timing restrictions which are more restrictive than those required by the FERC Procedures (e.g., June 1 through September 30 to protect coldwater fisheries; and June 1 through November 30 to protect coolwater and warmwater fisheries).**

Once construction is complete, streambeds would be restored to pre-construction conditions using native substrates excavated from the surface interval of streambed prior to construction, maintaining preconstruction sediment bed consistency to the fullest extent possible. No long-term impacts are anticipated after restoration of stream bottoms and regrowth of riparian vegetation.

4.3.3.3 Conclusions

No long-term effects on aquatic resources are anticipated as a result of construction and operation of the Project. PennEast would implement its E&SCP and FERC Plan and Procedures to minimize the extent and duration of Project-related disturbances to aquatic resources. PennEast would also implement its E&SCP to further reduce the potential for impacts related to accidental leaks, increased erosion, as well as sedimentation and stormwater runoff. The implementation of these measures would minimize impacts on aquatic resources.

Operation of the Project would not impact surface waters, unless maintenance activities involving pipe excavation and repair in or near streams are required; therefore, impacts on aquatic resources would not be expected. If maintenance in or near streams should occur, PennEast would employ protective measures similar to those proposed for construction of the Project. Consequently, we conclude that any maintenance-related effects would be short term and similar to those described above for the initial pipeline construction.

4.4 WETLANDS

Wetlands can be defined as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of wetland vegetation adapted for life in saturated soil conditions (USACE 1987). The USACE enforces the federal CWA, Section 404 (33 U.S.C. 1344) which regulates waters of the United States, including jurisdictional wetlands. Wetlands crossed by the Project were identified using site-specific field delineation results where access was available, and estimation of wetland boundaries using FWS NWI mapping in Pennsylvania, and NJDEP wetland mapping for Hunterdon and Mercer counties for areas where survey access has not been granted.

In the Project area, wetlands are regulated at both federal (USACE) and state (PADEP and NJDEP) levels. Under Section 404 of the CWA, the USACE is authorized to issue permits for activities that would result in the discharge of dredge or fill material into, or the dredging of, waters of the United States such as wetlands. Under Section 401 of the CWA, states are required to certify that proposed dredging or filling of waters of the United States meets state water quality standards.

4.4.1 Existing Wetland Resources

PennEast identified and delineated wetlands along the proposed pipeline route during field surveys in 2015 and 2016. Wetland boundaries were delineated using the methods described in the 1987 Corps of Engineers Wetlands Delineation Manual (USACE 1987) and the USACE regional supplements applicable to each Project facility. For areas where PennEast was unable to complete surveys, remote-sensing resources were used to approximate the locations and boundaries of wetlands within the Project area. Remote-sensing delineations were conducted using a combination of:

- high-resolution aerial photographic imagery;
- NWI data;
- NHD data;
- hydric soil data maintained by the NRCS;
- floodplain and flood elevations maintained by FEMA; and field survey results on adjacent land parcels.

PennEast classified wetlands in Pennsylvania (see appendix G-11) using information from the NWI mapping database (FWS 2009) for about 19 miles (23 percent) of the pipeline, combined with field delineations completed where survey access was granted to PennEast for about 61 miles (77 percent). Field delineations were performed at 103 crossing locations and the remaining 3 locations were based on estimated acreages from the NWI mapping database. In addition to the classifications used in this EIS (Cowardin 1979) the PADEP classifies wetlands as either exception value or other. Exceptional value wetlands are given special protection16 in the state of Pennsylvania by the PADEP under Pennsylvania Code Title 25 (Pennsylvania Code 1991) and include those wetlands that:

- serve as habitat for threatened and endangered species (or are hydrologically connected to or within 0.5 mile of such wetlands);
- are adjacent to a wild trout stream or exceptional value water;
- are along a designated drinking water supply; and
- are within natural or wild areas (e.g., federal and state lands).

Wetlands not classified as exceptional value were classified "other" wetlands. In Pennsylvania the Project would cross wetlands classified as being palustrine emergent wetlands (PEM), palustrine scrub-shrub wetlands (PSS), palustrine forested wetlands (PFO), and palustrine unconsolidated bottom (PUB), as well as vernal pools.

Wetland resources crossed by the Project in New Jersey (see appendix G-12) were identified using information from the NJDEP wetland mapping database for about 25 miles (72 percent) of the pipeline, combined with field delineations completed where survey access was granted to PennEast for about 11 miles (28 percent). Field delineations were performed at 31 crossing locations and the remaining 73 locations were based on estimated acreages from the NJDEP GeoWeb database. In New Jersey the Project would cross PEM, PFO, and PSS wetlands, as well as agricultural wetlands (MODAg) and lawns and stormwater management areas (MODL).

Construction of the Project would require 210 wetland crossings, 106 in Pennsylvania and 104 in New Jersey. Based on the information provided by PennEast the Project would impact a total of 56 acres of wetlands during construction, of which about 26 acres would be in Pennsylvania and 30 in New Jersey (see table 4.4.2-1 in section 4.4.2). Appendices G-11 and G-12 identify all wetland crossings by milepost in Pennsylvania and New Jersey, respectively.

PennEast has not been granted survey permission for the entire Project; hence, field wetland delineations are incomplete. Therefore, **we recommend that:**

- **<u>Prior to construction</u>, PennEast should file with the Secretary a complete wetland delineation report for the entire Project that includes all wetlands delineated in accordance with the USACE and the applicable state agency requirements.**

4.4.1.1 Wetland Types

PennEast classified wetlands based on Cowardin type, which is a widely used system that categorizes wetlands based on systems (e.g., palustrine) and classes (e.g., emergent, scrub-shrub, and forested). PennEast also classified wetlands meeting exceptional value criteria ((Pennsylvania Code § 105.17). The primary wetland types that were delineated in the proposed Project area are discussed below.

Palustrine Emergent Wetlands

PEM wetlands are characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens (Cowardin et. al., 1979). PEM wetlands include areas commonly referred to as marshes, wet meadows, and beaver flowage communities. The PEM wetland type exists on its own as well as in conjunction with other wetland types, creating a more heterogeneous wetland system. PEM wetlands are often associated with utility right-of-ways, abandoned agricultural areas, and open waterbodies.

Palustrine Scrub-Shrub Wetlands

PSS wetland cover type includes areas that are dominated by saplings and shrubs that typically form a low and compact structure less than 20 feet tall (Cowardin et. al., 1979). The structure and composition of the vegetation within this cover type may be influenced by the water regime and, where located within existing right-of-ways, by utility maintenance practices. Most of these communities are seasonally flooded and often saturated to the surface. Many PSS wetlands are associated with emergent wetlands as part of large complexes. These PSS wetlands are also the dominant along existing electric transmission right-of-ways.

Palustrine Forested Wetlands

PFO wetlands are broad-leaved deciduous wetlands, found in association with streams and seeps or as isolated depressions. These wetlands typically occur in areas where the topography is low and flat or along waterbodies. PFO wetland cover types are dominated by trees and shrubs that have developed a tolerance to a seasonal high water table. In order to be characterized as forested, a wetland must be dominated by trees and shrubs that are at least six meters tall (Cowardin et. al., 1979). PFO wetlands typically have a mature tree canopy which, depending upon the species and density, can have a broad range of understory and groundcover community components.

4.4.1.2 Vernal Pools

Vernal pools are unique, seasonal wetland habitats, and are typically small, shallow ephemeral waterbodies with no permanent inlet or outlet. These pools are filled seasonally each spring by rain, snow melt, or groundwater, and then become dry for a period of time during the summer.

Vernal pools are important aquatic habitats that support unique animal species, provide critical habitat for breeding amphibians, and serve as an important resource for many species of birds, mammals, reptiles, amphibians, and invertebrates. Vernal pools are not always vegetated; however, vegetation commonly found within the vernal pools in the Project area include herbaceous species such as mannagrass (*Glyceria acutiflora*), rice cut-grass (*Leersia oryzoides*), wool-grass (*Scirpus cyperinus*), smart-weeds (*Persicaria* spp.), soft rush (*Juncus effusus*), beggars-ticks (*Bidens* spp.), cinnamon fern, royal fern (*Osmunda regalis*), and arrowhead (*Sagittaria* spp.). Typical woody species found in vernal pools in this area include highbush blueberry (*Vaccinium corymbosum*), pin oak (*Quercus palustris*), red maple (*Acer rubrum)*, willows (*Salix* spp.), buttonbush (*Cephalanthus occidentalis*), and winterberry holly (*Ilex verticillata*). As a result, vernal pools are considered communities of special concern in both Pennsylvania and New Jersey.

Table 4.4.1-1 lists the vernal pools that would be crossed by the Project, based on existing databases such as the NHP databases, the New Jersey Department of Environmental Protection – Division of Fish and Wildlife's (NJDEP-DFW's) Vernal Pool Project, and the New Jersey state mapping database.

TABLE 4.4.1-1 Vernal Pools Potentially Crossed by the Project			
Milepost	**Length of Crossing (Feet)**	**Acres Potentially Affected – Construction**	**Acres Potentially Affected - Operation**
Pennsylvania			
MP 13.1	0	0	0
MP 25.2	0	0	0
MP 35.5	48	0.01	0.01
MP 52.4	25	0.03	0.03
MP 52.5	0	0	0
MP 52.6	67	0.09	0.07
New Jersey			
MP 89.5 a/	-	-	-
MP 90.5-90.8 a/	-	-	-
MP 98.5 a/	-	-	-
MP 102.5	0	0	0
MP 103.4-103.5 a/	-	-	-
MP 103.5	0	0	0
MP 103.5	0	0	0

Note:
a/ The areas identified at MP 89.5, MP 90.5-90.8, MP 98.5, MP 103.4-103.5 were based on review of the New Jersey GIS database for vernal pools (New Jersey Landscape Project Version 3.1 maps) and have not yet been field verified.

As of April 2016, PennEast had completed initial survey work identifying the presence of vernal pools. In Pennsylvania, these are surveys are 78.8 percent complete, and in New Jersey, these surveys are 25.8 percent complete. PennEast conducted field surveys for vernal pools along some portions of the Project in New Jersey in spring and summer of 2015 in accordance with NJDEP's Endangered and Non-game Species Program requirements (NJDEP-DFW 2010). PennEast indicated that vernal pool surveys will be conducted concurrently with wetland delineations on currently available parcels through May and June 2016. Vernal pools were identified in the general region around these areas, but not within the proposed Project's disturbance footprint.

Although surveys for vernal pools were conducted in some areas the remaining potential vernal pool areas identified in table 4.4.1-1 have not been surveyed to date; therefore, **we recommend that**:

- **<u>Prior to construction</u>, PennEast should survey all areas mapped as being potential vernal habitat and identify whether these areas contain vernal pool habitat that would be affected by the proposed alignment during construction or operation. The results of these surveys should be filed with the Secretary and the appropriate state agencies for review.**

4.4.2 Wetland Impacts and Mitigation

The standard crossing method for wetlands would be via open trench. PennEast would minimize the amount of time that topsoil is segregated and the trench is open to the extent possible. PennEast would use timber mats and would assemble the pipeline in upland locations to minimize wetland disturbance. Where trench dewatering is necessary, water would be discharged through an energy-dissipation structure such as a filter bag into a well-vegetated upland area to minimize erosion associated with discharge. PennEast would use "push-pull" and/or "float" techniques for crossing wetlands when conditions permit, which is typically when the water table is near the surface and adequate work space is available on either side of the wetland crossing. Installation and maintenance of erosion and sediment controls would be applied per PennEast's E&SCP.

Four of the proposed crossings in Pennsylvania, and 11 of the proposed crossings in New Jersey would be conducted using the HDD method (see appendices G-11 and G-12). Use of the HDD method would eliminate the need for mechanical clearing and grading, trenching, and the operation of heavy construction equipment within the wetland. Activities between HDD entry and exit points would be limited to foot traffic required for the placement of wire grids needed to guide the drill alignment. Construction in the remaining wetlands would be conducted in accordance with the wetland construction and mitigation measures identified in PennEast's E&SCP and in accordance with our Plan and Procedures, except in circumstances where PennEast would request site-specific ATWS to facilitate safe construction conditions. As discussed in Section 4.3.2.5, FERC Procedures require that ATWS be at least 50 feet away from wetland boundaries and waterbodies, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land. Appendix G-10 identifies wetland and waterbodies crossings that may require site-specific justification for ATWS within 50 feet of wetlands and waterbodies. PennEast has identified a total of 211 areas where ATWS would be required within 50 feet of wetlands and waterbodies.

At least one wetland, located immediately south of I-80 has been identified with extremely saturated soils. As past experience has shown that contractors are unable to contain these wetland soils within the standard 75-foot-wide wetland construction corridor due to the extremely high slump rate of the material, **we recommend that:**

- **<u>Prior to the end of the draft EIS comment period</u>, PennEast should file with the Secretary the special construction methods that it would implement during construction in extremely saturated wetlands. If additional workspace is required at the saturated wetlands along the pipeline alignment, PennEast should identify these in a table and provide site-specific justification for the additional workspace.**

Additionally, PennEast would comply with any permit conditions and mitigation requirements in the CWA Section 404 permits and Section 401 certifications.

Wetland impacts were calculated using the total proposed Project area, which includes ATWS, access roads, a construction right-of-way of 75 feet in width, and a 50-foot-wide operational/permanent right-of-way. No permanent fill or loss of wetland area would result from construction and operation of the Project. The Project would not result in loss of wetland acreage as all wetland fills would be temporary and all wetlands would be restored to pre-construction grades and contours. As shown in table 4.4.2-1, construction disturbance would affect about 56 acres of wetlands, and operation disturbance would affect about 35 acres of wetlands.

TABLE 4.4.2-1

Summary of Wetland Classifications Affected by Construction and Operation of the Project

Cowardin Classification (PA)/ NJDEP Classification	Length Crossed (feet)	Wetland Area Affected During Construction (acre)	Wetland Area Affected During Operation (acre)
PennEast Mainline – Pennsylvania a/, b/			
PEM	4,930	2.9	1.4
PFO	12,690	17.1	12.1
PSS	4,694	6.4	3.7
PUB	88	0.0	0.0
Vernal Pools	140	-	-
Hellertown Lateral – Pennsylvania			
(None)	0.0	0.0	0.0
Pennsylvania Total	**22,542**	**26.4**	**17.2**
PennEast Mainline – New Jersey b/			
PEM	1,644	3.3	1.5
PFO	7,491	11.5	8.1
PSS	1,794	3.1	2.0
MODAg	5,024	11.2	5.1
MODL	17	0.1	0.6
MODR	366	0.7	0.6
Gilbert Lateral – New Jersey			
(None)	0.0	0.0	0.0
Lambertville Lateral – New Jersey			
(None)	0.0	0.0	0.0
New Jersey Total	**16,443**	**29.9**	**17.9**
Project Total	**38,985**	**56.3**	**35.1**

Notes:
a/ The Kidder Compressor Station is included in the construction and operation acreage.
b/ Access roads are included in mainline pipeline construction and operation acreage.

The primary impact of pipeline construction and right-of-way maintenance activities on wetlands would be the temporary alteration of wetland vegetation and permanent conversion of forested wetlands to scrub-shrub wetlands, and forested and scrub-shrub wetlands to herbaceous emergent wetlands.

In PEM wetlands, the impact of construction would be relatively brief because the emergent vegetation would regenerate quickly, typically within one to three years. In PSS and PFO wetlands, PennEast would maintain a 10-foot-wide corridor centered over the pipeline in an herbaceous state and would selectively cut trees within a 30-foot-wide corridor centered over the pipeline. The remainder of forested and scrub-shrub vegetation would be allowed to return to preconstruction conditions and would not be further affected during operation.

Other effects on wetlands could include temporary changes in hydrology and water quality during construction. Temporary removal of wetland vegetation during construction could alter the capacity of wetlands to function as habitat and flood and erosion control buffers. Mixing topsoil with subsoil could alter nutrient availability and soil chemistry, thereby inhibiting recruitment of native wetland vegetation. Heavy equipment operating during construction could result in soil compaction or rutting that would alter natural hydrologic and soil conditions, potentially inhibiting germination of native seeds and the ability of plants to establish healthy root systems. Additionally, discharges from stormwater, dewatering structures, or hydrostatic testing could transport sediments and pollutants into wetlands, affecting water quality.

We received comments from federal and state agencies, as well as private landowners and organizations expressing concern about Project impacts on wetlands in regard to loss of habitat function and use for wildlife, soil compaction, depth of pipeline, increased erosion potential and questions about restoration and revegetation efforts.

The majority of the effects on wetlands from construction of the pipelines would be temporary and short term because PennEast would restore all wetlands to preconstruction contours and hydrology. PennEast would mitigate for unavoidable wetland impacts by implementing the procedures specified in its E&SCP and by complying with the conditions of its pending Section 404 and 401 permits. Specific wetlands-related measures that PennEast would implement to minimize and mitigate wetland impacts, include, but are not limited to, the following:

- limit construction activity and ground disturbance in wetland areas to a construction right-of-way width of 75 feet or as shown on the construction drawings. With written approval from the FERC for site-specific conditions, construction right-of-way width within the boundaries of federally delineated wetlands may be expanded beyond 75 feet;
- clearly mark wetland boundaries and buffers in the field with signs and/or highly visible flagging until construction-related ground disturbing activities are complete;
- avoid cutting vegetation just above ground level and grind stumps to ground level, leaving existing root systems in place. Immediately remove all cut trees and branches from the wetland and stockpile in an upland area on right-of-way for disposal;
- locate ATWS at least 50 feet from wetland boundaries except where site-specific conditions warrant otherwise and FERC approval has been obtained;
- do not cut trees outside of the construction right-of-way to obtain timber for riprap or equipment mats;
- segregate the top 12 inches of topsoil within the ditchline, except in areas where standing water is present or soils are saturated;
- revegetate the right-of-way with annual ryegrass at 40 pounds/acre PLS or with the recommended wetland seed mix identified in PennEast's E&SCP, unless standing water is present. Scrub-shrub and forested areas should be planted and/or seeded with appropriate plants to facilitate the regeneration of that wetland type originally present before construction for those areas that are not part of the maintained operational right-of-way. Do not use mulch, lime or fertilizer in wetland areas unless required in writing by the appropriate federal or state agency; and

- avoid storage of hazardous materials, chemicals, fuels, or lubricating oils within 100 feet of any wetland, waterbody, or within any designated municipal watershed area where feasible. If the 100-foot setback cannot be met, this activity would be performed within the 100-foot setback, with Environmental Inspector (EI) approval, if done in accordance with the SPCC Plan.

Following construction, disturbed areas would be restored to pre-construction soil and hydrology conditions and vegetation. As discussed in section 4.5, PennEast would use only plant species that are native to the local area for revegetation of the Project area to facilitate the regeneration of the wetland type originally present before construction. In PEM wetlands, the herbaceous vegetation would regenerate quickly (within one to three years). Following revegetation, the permanent impact on emergent vegetation in the maintained right-of-way would be minimal because these areas consist of and would remain as open and herbaceous communities. The duration of the impact on PSS and PFO wetlands would be longer. Woody vegetation may take several years to regenerate and the re-establishment of large woody vegetation would be precluded on a portion of the permanent right-of-way by routine vegetation maintenance activities during pipeline operation. This would permanently convert previously PFO wetland areas within the maintained right-of-way to non-forested wetlands and PSS wetland areas to PEM wetlands.

During Project operation, routine maintenance of the right-of-way would be required to allow continued access for routine pipeline patrols, maintaining access in the event of emergency repairs, and visibility during aerial patrols. PennEast would minimize wetland impacts during operation by implementing the measures contained in its E&SCP. Specific measures that would be implemented, include, but are not limited to, the following:

- to facilitate periodic corrosion and leak surveys, a 10-foot wide corridor centered on the pipeline may be cleared at a frequency necessary to maintain the 10-foot wide corridor in an herbaceous state.

In accordance with its E&SCP, PennEast would conduct post-construction monitoring. PennEast would conduct follow-up inspections of all disturbed areas as necessary to determine the success of revegetation and address landowner concerns. At a minimum, in accordance with FERC Procedures, PennEast would conduct inspections after the first and second growing seasons. PennEast would monitor and record the success of wetland revegetation annually until wetland revegetation is successful as provided in appropriate Federal and State permits. For any wetland where vegetation is not successful at the end of three years after construction, PennEast would develop and implement (in consultation with a professional wetland ecologist) a plan to actively revegetate the wetland with native wetland herbaceous and woody plant species.

PennEast has developed a preliminary Compensatory Wetland Mitigation Plan for permanent wetland impacts in Pennsylvania (WHM Group 2015), which would offset functional changes associated with the conversion of PFO and PSS wetlands to PEM wetlands within the 30-foot-wide right-of-way that PennEast would maintain during operations. The three proposed mitigation sites in Pennsylvania would be constructed in the Upper Central Susquehanna and the Central Delaware River subbasins. PennEast submitted a proposed compensatory mitigation plan to the PADEP and USACE with the joint permit applications on February 5, 2016. Additionally, PennEast has developed a separate Preliminary Wetland Mitigation, Riparian Zone Compensation, and Construction Related Disturbance Restoration Proposal to preliminarily address the requirements for compensatory wetland mitigation, riparian zone compensation, and restoration of construction related disturbances associated with the anticipated New Jersey Freshwater Wetlands Individual Permit and New Jersey Flood Hazard Area Individual Permit for the Project. Per comments from USACE PennEast would be required monitoring of restored areas to comply with USACE and state permits.

As mitigation design progresses, further coordination with USAEC, PADEP, and the NJDEP Mitigation Unit would be required to incorporate site-specific design features and/or modifications, as applicable. Therefore, **we recommend that:**

- **Prior to construction, PennEast should finalize a Project-specific Wetland Restoration Plan in consultation with the USACE and applicable state agencies in Pennsylvania and New Jersey, and file the plan with the Secretary. PennEast should provide documentation of its consultation with the applicable federal and state agencies.**

Vernal pools are considered to be communities of special concern in both Pennsylvania and New Jersey and the Project would impact several vernal pool areas within the proposed pipeline right-of-way. Based on current information, approximately 0.13 acre of vernal pool habitats would be affected by construction of the Project, with 0.11 acre permanently impacted during operation (see table 4.4.1-1). Should additional potential vernal habitats during surveys prior to construction, a time of year restriction would be observed by PennEast if vernal habitats cannot be avoided. This time of year restriction would be observed during the key breeding period for obligate and facultative amphibian species (i.e., March through June). All temporarily disturbed areas would be restored to pre-construction conditions following pipeline installation.

4.4.3 Conclusions

While minor adverse and long-term effects on wetlands would occur, with adherence to PennEast's E&SCP and FERC Procedures, we conclude that construction and operation of the Project would result in minor effects on wetlands that would be appropriately mitigated and reduced to less than significant levels. In addition, impacts on wetlands would be further mitigated through PennEast's implementation of an agency-approved mitigation plan.

4.5 VEGETATION AND WILDLIFE

4.5.1 Vegetation

The Pennsylvania portion of the proposed Project lies within the Appalachian Highlands land form and the Central Appalachian Broadleaf Forest-Coniferous Forest-Meadow ecosystem province (Bailey 1998). The Central Appalachian Broadleaf Forest ecosystem province is described as a temperate area, with distinct summer and winter seasons. Precipitation averages in this ecosystem are the highest in the eastern United States. Typical vegetation in these provinces are characterized by a closed canopy of deciduous, xerophytic tree species, mainly oaks, although many mesophytic species occur on lower slopes and in mountain valleys; broadleaf forests change to coniferous or shrub lands at higher elevations (Bailey 1998).

The New Jersey portion of the proposed Project lies within the mid-Atlantic coastal plain land form and entirely within the Eastern Broadleaf Forest (Oceanic) ecosystem province (Bailey 1998). The area is described as humid temperate, with warm summers and cool winters. Rainfall occurs year round, increasing significantly in the summer months, when evapotranspiration and moisture demands of the plant communities are high. This province is characterized by a winter deciduous forest (sometimes called temperate deciduous forest) dominated by tall broadleaf trees that provide a dense, continuous canopy in summer and shed their leaves completely in winter (Bailey 1998).

The vegetation/cover types that would be crossed by the proposed Project include agricultural, forest/woodland, open land, residential, industrial/commercial, and open water. For the purpose of this EIS section on vegetation, wetlands are included within the open land and forest/woodland category based upon herbaceous (classified as open land) or forested (classified as forest/woodland) wetland types. Wetlands are also described in more detail in section 4.4 (wetland section). Open water habitats are discussed in section 4.3 (water resources section).

PennEast has conducted surveys for biological resources (e.g., wetlands, weeds, vegetation and terrestrial species, ESA listed species, etc.) within portions of the Project's route (surveys were conducted within a 400-foot corridor around the Project) in 2015 and 2016; however, surveys have yet to be completed for all portions of the Project area (see appendix G-13). If the Commission decides to authorize the Project, the Certificate would grant PennEast the right to pursue access through eminent domain, at which time PennEast would complete the necessary remaining field surveys.

4.5.1.1 Existing Vegetation Resources

The general vegetation types along the Project are:

- *Agricultural Land*: These areas are predominately cultivated cropland or pastures. Some orchards, along with hay fields, corn (*Zea mays*) fields, and pastures also occur.
- *Forest/Woodland*: Forests typically have dense and extensive tree cover (i.e., dense canopy areas), while woodlands typically have smaller trees that are short-boled relative to their crown depth (forming open canopies; Helms 1998). This vegetation type includes forested/woodland wetlands and upland forest/woodlands. The predominant forest/woodland community crossed by the proposed Project is deciduous broadleaf forest. Mixed deciduous broadleaf/coniferous forests are also present along the Project. Common

tree species found in these forests included American beech (*Fagus grandifolia*), sweet birch (*Betula lenta*), gray birch (*Betula populifolia*), red oak (*Quercus rubra*), chestnut oak (*Quercus prinus*), scrub oak (*Quercus ilicifolia*), white pine (*Pinus strobus*), eastern hemlock (*Tsuga canadensis*), red maple (*Acer rubrum*), and downy serviceberry (*Amelanchier borea*).

- *Open Land*: These areas are non-forested, non-agricultural lands, including herbaceous and scrub-shrub wetlands (PEM and PSS wetland types as defined by Cowardin; see section 4.4 – wetlands), and areas containing utility line rights-of-way. The plant species found within non-wetland lands are typically weedy or early successional species. Wetland species found in these areas are discussed in section 4.4.
- *Residential Land and Industrial/Commercial Land*: This cover type includes developed lands, such as residential and commercial areas inclusive of landscaped areas. Vegetation found in these areas include urban lawns, as well as both native and non-native species of ornamental trees and shrubs. Roadway medians and embankments within this area can include non-managed vegetation such as crown vetch (*Coronilla varia*).

Vegetative Communities of Special Concern

The Pennsylvania Department of Conservation and Natural Resources (PADCNR), the NJDEP Natural Heritage Program (NHP), and stakeholders identified several vegetative communities of special concern that could occur along the Project. In addition, these agencies and stakeholders identified some areas that are likely to contain vegetative communities of special concern, which include the Bear Creek Preserve, Milford Bluffs, Goat Hill, and Sourland Mountain. These communities and areas are described in table 4.5.1-1.

TABLE 4.5.1-1

Vegetation Communities of Concern Potentially Crossed by the Project

Vegetative Community	Description	State Rank a/	Counties of Potential Occurrence
Vegetative Communities of Concern			
Ephemeral/fluctuating natural pool	These are vernal pool habitats. These communities have been found in the Project area during surveys (see section 4.3 for more details)	S3/S4	All
Herbaceous vernal pond	This is a type of vernal pool habitat that is characterized by seasonally fluctuating water levels that may dry out completely in the summer. The substrate is mineral soil with or without a layer of muck. The species composition is variable between sites, as well as annually and seasonally. These vernal pool habitats have been found in the Project area during surveys (see section 4.3 for more details)	S3/S4	All Counties
Leatherleaf – Cranberry bog	This dwarf shrub-dominated community is often part of the classic floating/quaking bog-mat community matrix found in glaciated areas of northern Pennsylvania. In glacial bogs, this community often occupies the central zone or one of the final zones of rooted vegetation surrounding an open water interior. This community type usually occurs in oligotrophic, peat-accumulating basins as part of the acidic glacial peatland complex. Substrate is organic and may be flooded at times but remains saturated throughout the growing season. The peatland where this community usually occurs may be oligotrophic or influenced by groundwater. No Leatherleaf – Cranberry bog communities have been located within the Project area during surveys to-date.	S2/S3	Luzerne

TABLE 4.5.1-1 Vegetation Communities of Concern Potentially Crossed by the Project			
Vegetative Community	**Description**	**State Rank a/**	**Counties of Potential Occurrence**
Pitch pine – rhodora – scrub oak woodland	This community is part of the "Mesic till barren complex." This is a unique group of communities restricted to the southern Pocono Plateau. The barren-like vegetation does not appear to be a response to droughty or nutrient-poor soils. The same deep, fine-loamy Illinoian till on which it occurs also underlies the adjacent forests. The origin of the barrens, and the processes responsible for their persistence and distribution are not known, but fire appears to be a critical factor. All areas of the complex include regions with at least 10% cover by trees; which mostly consists of pitch pine *(Pinus rigida*) and red maple (*Acer rubrum*). No Pitch pine – rhodora – scrub oak woodland communities have been located within the Project area during surveys to-date.	S1	Carbon, Luzerne
Red spruce palustrine woodland	These areas tend to be small in size, or may occur as part of a structurally diverse wetland complex. The substrate is usually sphagnum peat. Total tree cover is sparse, usually between 10 and 60 percent (most often less than 40 percent). No Red spruce palustrine woodland communities have been located within the Project area during surveys to-date.	S2/ S3	Northampton, Carbon, Luzerne
Areas in Pennsylvania that likely contain Vegetative Communities of Concern			
Bear Creek Preserve	A 3,400-acre property owned by the Natural Lands Trust in Luzerne County, Pennsylvania. The pipeline crosses this preserve along MP 19.7 to MP 21.5. Wetlands have been identified and delineated as part of this land area (see section 4.4). The portion of the Bear Creek Preserve that would be crossed by the Project has been surveyed by PennEast; no vegetative communities of concern were located in this area during these surveys.	N/A	Luzerne
Areas in New Jersey that likely contain Vegetative Communities of Concern			
Milford Bluffs	Steep shale cliffs along the edge of the Delaware River with deciduous woodlands and low level residential housing. This area was originally to be crossed by the Project at approximately milepost 81.5 to 82; however, the Project's route has been modified to avoid this area,	B3 / V1	Hunterdon
Goat Hill	Steep wooded diabase hillside that contains three endangered plant species. This area would be crossed by the Project at approximately milepost 103.9 to 104.2. Surveys have not been conducted within this area and vegetation communities of concern could occur along the Project in this area.	B4	Hunterdon and Mercer
Sourland Mountain	This area comprises the largest contiguous forests in central New Jersey, is sparsely populated, and contains a complex ecosystem of forest, wetlands, and grasslands. As a result, it supports a rich diversity of plant and animal species and is acknowledged by PennEast as being an ecologically significant area. The Project would cross the Sourland between MPs 100.4 and 108.3. PennEast has acknowledged the ecological significance of areas of the Sourland Mountain region in New Jersey, and efforts were made during the siting process to avoid potential impacts on undisturbed forests such as those of the Sourland Mountain region. PennEast would co-locate the construction right-of-way adjacent to or in proximity to an existing utility right-of-way in this area to reduce fragmentation of undisturbed forested areas in the Sourland Mountains region. The portion of the Sourland Mountain area that would be crossed by the Project has been surveyed by PennEast; no vegetative communities of concern were located in this area during these surveys.	N/A	Hunterdon, Mercer, and Somerset

Note:
a/: S1 = *Critically* imperiled, S2 = Imperiled, S3 = Vulnerable, S4 = Apparently secure, B3 = High significance on a global level, B4 = Moderate significance on a global level, V1 = Outstanding significance on a state level.

4.5.1.2 General Impacts and Mitigation

Table 4.7.1-1 in section 4.7 (i.e., Land Use and Visual section) lists the acres of various vegetation types that would be affected by construction and operation of the Project. As shown in table 4.7.1-1, about 1,613.5 acres would be affected during the construction of the Project (consisting of about 633 acres of forested areas and 981 acres of non-forested areas). About 784 acres of this area would also be permanently affected during operation of the Project (i.e., these areas would be encompassed by the permanent right-of-way or permanent Project features); of this, about 452 acres of permanent operational impacts would occur to forested areas and 332 acres to non-forested areas.

Construction areas would be cleared of vegetation in order to provide a safe working area. The limits of clearing would be identified and flagged in the field prior to the start of clearing activities, and PennEast would install erosion control measures following the initial disturbance of the soil as described in its E&SCP contained in appendix D. The cleared width within the construction right-of-way and ATWSs would be kept to the minimum required to safely construct the pipeline (see section 2.2.1). Areas temporarily disturbed during construction would be reseeded (in accordance with FERC's Plan and Procedures as well as any recommendations made by the local soil conservation district or land managing agency) and allowed to revegetate to preconstruction cover types. In accordance with PennEast's E&SCP, PennEast would monitor revegetated areas to ensure the post-construction revegetation is successful. Impacts are expected to be "short-term" in non-forested areas that are allowed to restore to preconstruction conditions, as it is expected that these non-forested areas would be successfully restored within 3 years following construction (with implementation of PennEast's E&SCP and FERC's Plan and Procedures). However, all impacts on forested habitats would be considered long-term because of the time (i.e., more than 30 years) required to restore woody vegetation to preconstruction conditions.

Following construction, all temporarily disturbed areas would be restored in accordance with our Plan and Procedures. During operation, routine maintenance of the right-of-way would occur to allow continued access for routine pipeline patrols, and to maintain access in the event of emergency repairs as well as to maintain visibility during aerial patrols. In upland areas, maintenance of the right-of-way would involve clearing the entire permanent right-of-way of woody vegetation (e.g., the maintained permanent rights-of-way would be mowed every 3 years to clear woody vegetation). To facilitate periodic corrosion surveys, a 10-foot-wide strip centered on the pipeline would be mowed annually to maintain herbaceous growth.

About 452 acres of forest would be permanently converted to an herbaceous state (i.e., not allowed to restore to preconstruction conditions) and would be reseeded in accordance with PennEast's E&SCP and FERC's Plan and Procedures within the maintained portion of the permanent right-of-way and compressor station. The temporarily disturbed forested areas outside of these permanent maintained areas (see table 4.7.1-1) would be restored through natural recolonization, but as discussed above, even temporarily disturbed forested areas would still require many years to reestablish to preconstruction conditions. PennEast has committed to actively replanting the affected forested area located within nature preserves, state parkland, or state gamelands in Pennsylvania, as well as the Green Acres properties in New Jersey (see

Appendix G-14) with tree seedlings in order to increase the speed in which affected forests within these sensitive areas restore to preconstruction conditions.

Impacts on forest habitat could include fragmentation and edge effects. Construction in forest lands would remove mature trees from the construction right-of-way. In addition, portions of the forest canopy that overhang work areas may be trimmed as needed. Felled trees would be cut into lengths, chipped on the right-of-way, or removed to an approved site. In temporary construction work areas, tree stumps and rootstock would be left in place wherever possible to facilitate natural revegetation. The loss of forest habitat and resulting edge effects could decrease the quality of habitat for forest dependent species, including alteration of habitat resulting from increased light levels and a subsequent loss of soil moisture as a result of the new forest edge.

To minimize the fragmentation of large contiguous stands of forest and the associated edge effects, the proposed pipeline route was sited to avoid areas containing large, interior forested stands where possible. When forests could not be avoided, proposed routing through a forest was accomplished by locating the pipeline as far from the interior portion of the forest as practicable to maximize preservation of interior forest habitat. During initial planning of the pipeline's route, PennEast attempted to choose the shortest crossing length practical through large contiguous forest stands while taking into account other environmental and engineering constraints. Approximately 44 miles of the pipeline route would be located adjacent to existing rights-of-way for this purpose, which totals to approximately 37 percent of the Project's length.

PennEast is currently proposing to use some forested areas as pipe storage-yards; however, the use of these areas to store pipes during construction would require the clearing of timber, as well as potentially expose these areas to soil compaction and decreased productivity/health of adjacent forested areas (e.g., if trees along the edge of the storage-yard are damaged during use of these area by the Project). Therefore, **we recommend that:**

- **<u>Prior to construction</u>, PennEast should modify its proposal to exclude the use of forested areas as pipe storage-yards.**

The NJDEP's (2014b) No-Net Loss Reforestation Act (NNLRA) requires mitigation if 0.5 acre or more of forested areas within New Jersey are affected. Table 4.5.1-2 identifies eight properties located in New Jersey that are state-owned and would be affected by the Project. Approximately 19.9 acres of forested land would be subject to the NNLRA restoration requirements. To mitigate impacts on forested areas in compliance with the NNLRA, PennEast would assess the purchase and permanent conservation of forested lands in key watersheds and reforestation areas or develop mitigation measures for restoring areas of temporary Project impacts in New Jersey. Compensation would be determined based on final Project acreage impacts and grid method assessment techniques consistent with the NNLRA requirements. However, because PennEast has not yet developed a NNLRA restoration plan to-date, **we recommend that**:

- **<u>Prior to construction</u>, PennEast should develop a New Jersey No-Net Loss Reforestation Act Plan for the parcels identified in table 4.5.1-2 of the EIS, in coordination with NJDEP and file the plan with the Secretary.**

TABLE 4.5.1-2

State-Owned Parcels in New Jersey Subject to No-net Loss Reforestation Act

Route	County	Municipality	Line List #	Begin Milepost	End Milepost	Owner	Crossing Length (feet)	Permanent Impact (Total Acers)	Permanent Impact (Forested Acres)	Temp. Impact (Total Acres)	Temp. Impact (Forested Acres)	Total Impacts (Total Acres)	Facility
PennEast	Hunterdon	Holland	PE-HU-046.000	81.1	81.5	State of New Jersey - DEP	1,593	1.8	1.3	5.4	2.8	7.2	Gravel Hill Preserve Natural Lands Trust
PennEast	Hunterdon	Holland	PE-HU-A063.000	81.5	81.8	State of New Jersey - DEP	1,551	1.8	0.5	4.3	1.0	6.1	Gravel Hill Preserve Natural Lands Ttrust
PennEast	Hunterdon	Holland	PE-HU-A083.000	82.2	82.2	State of New Jersey - DEP	0	0.0	0.0	0.0	0.0	0.0	Gravel Hill Preserve Natural Lands Trust
PennEast	Hunterdon	Alexandria	PE-HU-094.000	87.5	87.7	State of New Jersey - DEP	0	0.0	0.0	1.6	1.3	1.6	Unknown
PennEast	Hunterdon	West Amwell	PE-HU-232.000	102.9	103.1	State of New Jersey - DEP	0	0.0	0.0	0.8	0.0	0.8	Unknown
PennEast	Hunterdon	West Amwell	PE-HU-240.000	103.7	103.8	State of New Jersey - DEP	269	0.3	0.3	0.7	0.6	1.0	Washington Crossing SP
PennEast	Mercer	Hopewell	PE-ME-020.000	107.8	108.2	State of New Jersey - DEP	2,205	2.5	2.3	6.9	6.0	9.4	Kuser Mtn (Baldpate Mtn) Washington Crossing SP
Lambertville Lateral	Hunterdon	West Amwell	LB-HU-A003.000	1.4	1.4	State of New Jersey - DOT	0	0.0	0.0	0.2	0.1	0.2	Unknown

Note:
The totals shown in this table may not equal the sum of addends due to rounding.

Noxious Weeds and Other Invasive Plant Species

The term "invasive plant species" typically refers to plants that are non-native and are capable of aggressive growth, thereby displacing native species. A subset of invasive plant species referred to as "noxious weeds" are plants that the state identifies as being particularly detrimental to public health, or natural and economic resources. The Project has the potential (through the disturbance of habitats and soils) to spread existing invasive plant species as well as create conditions that promote the establishment of new infestations.

Invasive plant species have been documented near the proposed Project in Pennsylvania and New Jersey during field surveys conducted by PennEast. These species include Asiatic smartweed (*Persicarea longiseta*), autumn olive (*Elaegnus umbellata*), bugleweed (*Ajuga reptans*), bull thistle (*Cirsium vulgare*), common reed (*Phragmites australis*), garlic mustard (*Allliaria petiolata*), hedge bedstraw (*Gallium mollugo*), Japanese angelica tree (*Aralia elata*), Japanese barberry (*Berberis thunbergii*), Japanese honeysuckle (*Lonicera japonica*), Japanese stilt grass (*Microstegium vimineum*), Morrow's honeysuckle (*Lonicera morrowii*), multiflora rose (*Rosa multiflora*), mugwort (*Artemisia vulgaris*), Oriental bittersweet (*Celastrus orbiculatus*), purple loosestrife (*Lythrum salicaria*), reed canary grass *(Phalaris arundinaceae*), spotted knapweed (*Centaurea stobe*), and tall ryegrass (*Schedonorus arundinaceus*) (Ebert 2015).

The most commonly documented invasive species found in the Pennsylvania portion of the proposed Project during PennEast's surveys area are: Japanese stilt grass; Japanese barberry; and Japanese honeysuckle. Japanese stilt grass is the dominant species and occurs in dense stands in disturbed areas of Carbon and Northampton counties. Stands of Japanese stilt grass were identified from MPs 49 to 49.4; 52.4 to 53.3; and 59.2 to 60.7 of the pipeline. Reed canary grass was noted at milepost 34.7, as well as from wetlands within pre-existing rights-of-ways. Japanese barberry was often documented in upland forested areas from MPs 49 to 52.4. Finally, Japanese angelica tree was observed in several locations from MPs 0.7 to 1.4.

The most commonly documented invasive species found in the New Jersey portion of the proposed Project area includes Japanese stilt grass, Japanese honeysuckle, and multiflora rose. These species were observed throughout the entire length of the New Jersey corridor that was accessible and surveyed.

PennEast would work with the appropriate regulatory agencies (e.g. PADEP, NJDEP, PADCNR) as part of the permitting process to minimize the potential that invasive or noxious plant species to spread during construction of the Project. An Invasive Species Management Plan has yet to be developed by PennEast. In order to minimize the risk of invasive plants spreading within the Project rights-of-way and to control existing invasive populations that might prevent successful revegetation of the area, **we recommend that**

- **<u>Prior to construction</u>, PennEast should develop an Invasive Species Management Plan in consultation with appropriate state agencies that includes measures it would implement during construction and operation to minimize the spread of invasive and noxious plant species along with documentation of consultation with the relevant agencies.**

4.5.2 Wildlife

4.5.2.1 Existing Wildlife Resources

A wide variety of wildlife species are likely to occur in each of the vegetation cover types crossed by the Project. The following provides a general list of common species that are expected to occur in the cover types crossed by the Project.

- *Agricultural Land*: This cover type is often inhabited by species considered to be generalists in nature. Agricultural lands throughout the Project area are often interspersed with upland forest and wetland habitat, further increasing the habitat value of these lands to wildlife. Bird species that are commonly found using agricultural lands include eastern wild turkey (*Meleagris gallopavo silvestris*), American kestrel (*Falco sparverius*), eastern meadowlark (*Sturnella magna*) and mourning dove (*Zenaida macroura*). Mammal species that are commonly found using these lands include woodchuck (*Marmota monax*), striped skunk (*Mephitis mephitis*), meadow vole (*Microtus pennyslvanicus*) and white-footed mouse (*Peromyscus leucopus*), white-tailed deer (*Odocoileus verginianus*), and red fox. White-tailed deer often use agricultural land for feeding and resting, while red fox may use these lands for feeding on prey species (e.g., small mammals and birds).
- *Forest/Woodland*: These forested/woodland habitats provide a variety of microhabitats, including the overstory tree canopy, the understory or shrub layer, as well as the ground cover and leaf litter found on the forest floor. Common mammals found in this cover type include white-tailed deer, raccoon (*Procyon lotor*), gray squirrel (*Sciurus carolinensis*), white-footed mouse, eastern chipmunk (*Tamias striatus*), and short-tail shrew (*Blarina brevicauda*). Bird species commonly found include red-tailed hawk (*Buteo jamaicensis*), rose-breasted grosbeak (*Pheucticus ludovicianus*), pileated woodpecker (*Dryocopus pileatus*), and red-eyed vireo (*Vireo olivaceous*). Bird species that inhabit the understory include blue jay (*Cyanocitta cristata*), northern cardinal (*Cardinalis cardinalis*), white-breasted nuthatch (*Sitta carolinensis*), and black-capped chickadee (*Poecile atricapillus*). A variety of species groups will inhabit the forest floor including invertebrates, mammals, reptiles, and amphibians. Mammal species found on the forest floor can include white-footed mouse, eastern chipmunk, and short-tail shrew, while the reptile and amphibian species can include eastern box turtle (*Terrapene carolina*), red-backed salamander (*Plethodon cinereus*) and American toad (*Bufo americanus*) (Collins 1981; PGC 2013; New Jersey Audubon 2014a).
- *Open Land*: This cover type supports many herbaceous species and low-growing woody vegetation that can serve as protection or food sources for wildlife species. Open land were classified as being non-forested lands, uncultivated grassland, emergent wetlands, scrub-shrub areas, and maintained utility right-of-way. It is typical for small to medium-sized mammals and birds to inhabit uncultivated areas. Open and grassy areas could also serve as habitat for reptile and amphibian species.
- Wildlife species often present in emergent wetlands include amphibians such as green frog (*Rana clamitans*) and bullfrog (*Rana catesbeiana*); reptiles such as northern water snake (*Nerodia sipedon*); and birds such as redwing blackbird (*Agelaius phoenicus*), common yellowthroat (*Geothlypis trichas*), and Canada goose (*Branta canadensis*). Wildlife species often present in scrub-shrub wetlands include northern black racer (*Coluber*

constrictor), Carolina wren (*Thryothorus ludovicianus*), and raccoon (Collins 1981; PGC 2013; New Jersey Audubon 2014a).

- *Residential Land and Industrial/Commercial Land*: These cover types are, by nature, influenced by human impacts (e.g., contain paved and landscaped areas), and wildlife species that generally occur within these cover types are adapted to human presence. Within the Project area, developed lands primarily consist of roadways, industrial/commercial parks, and residential properties. These areas typically provide little wildlife habitat, and mostly support opportunistic species, including gray squirrel, American crow (*Corvus brachyrhynchos*), European starling (*Sturnus vulgaris*), and opossum (*Didelphis virginiana*) (Collins 1981; PGC 2013; New Jersey Audubon 2014a).
- *Open Water*: Open water habitats and aquatic species are discussed in detail within section 4.3. Terrestrial species commonly found in open water habitats include various species of water fowl, as well as other species typically found in emergent wetland habitats (see discussion above).

PennEast conducted surveys of the Project area during fall of 2014 and summer of 2015. Wildlife species that were observed during these field surveys are identified in table 4.5.2-1 (details regarding the occurrence of threatened and endangered species are included in section 4.6).

TABLE 4.5.2-1

Wildlife Species Observed along the Project

Common Name	Scientific Name	State
Mammals		
Beaver	*Castor canadensis*	Pennsylvania
Black bear	*Ursus americanus*	Pennsylvania
Coyote - signs present	*Canis latrans*	Pennsylvania
Eastern small-footed bat a/	*Myotis leibii*	Pennsylvania
Eastern chipmunk	*Tamias striatus*	Pennsylvania
Gray squirrel	*Sciurus carolinensis*	Pennsylvania
Little brown bat	*Myotis lucifugus*	New Jersey
Northern long-eared bat b/	*Myotis septentrionalis*	Pennsylvania and New Jersey
Porcupine	*Erethizon dorsatum*	Pennsylvania
Raccoon	*Procyon lotor*	Pennsylvania
Red squirrel	*Tamiasciurus hudsonicus*	Pennsylvania
Shrew sp.	*Sorex sp.*	Pennsylvania
Tri-colored bat	*Perimyotis subflavus*	New Jersey
White-tailed deer	*Odocoileus virginianus*	Pennsylvania
Woodchuck	*Marmota monax*	Pennsylvania and New Jersey
Birds		
American crow	*Corvus brachyrhynchos*	Pennsylvania and New Jersey
American goldfinch	*Carduelis tristis*	New Jersey
American kestrel a/	*Falco sparverius*	New Jersey
American robin	*Turdus migratorius*	Pennsylvania and New Jersey
Bald eagle c/	*Haliaeetus leucocephalus*	New Jersey
Barn swallow	*Hirundo rustica*	New Jersey
Black vulture	*Coragyps atratus*	New Jersey
Black-billed cuckoo a/	*Coccyzus erythropthalmus*	New Jersey

TABLE 4.5.2-1

Wildlife Species Observed along the Project

Common Name	Scientific Name	State
Black-capped chickadee	*Poecile atricapilla*	Pennsylvania and New Jersey
Black-throated green warbler a/	*Setophaga virens*	New Jersey
Blue jay	*Cyanocitta cristata*	Pennsylvania and New Jersey
Bobolink a/	*Dolichonyx oryzivorus*	New Jersey
Brown thrasher a/	*Toxostoma rufum*	New Jersey
Canada goose	*Branta canadensis*	Pennsylvania and New Jersey
Carolina wren	*Thryothorus ludovicianus*	Pennsylvania
Common raven	*Corvus corax*	Pennsylvania
Common yellowthroat	*Geothlypis trichas*	New Jersey
Cooper's hawk a/ d/	*Accipter cooperii*	Pennsylvania and New Jersey
Downy woodpecker	*Picoides pubescens*	Pennsylvania
Eastern towhee	*Pipilo erythrophthalmus*	Pennsylvania
Eastern wood pewee	*Contopus virens*	New Jersey
European starling	*Sturnus vulgaris*	Pennsylvania
Field sparrow	*Spizella pusilla*	New Jersey
Gray catbird	*Dumetella carolinensis*	Pennsylvania and New Jersey
Great blue heron a/	*Ardea herodias*	New Jersey
Hairy woodpecker	*Leuconotopicus villosus*	New Jersey
House finch	*Haemorhous mexicanus*	New Jersey
House wren	*Troglodytes aedon*	New Jersey
House sparrow	*Passer domesticus*	Pennsylvania
Mallard duck	*Anas platyrhynchos*	Pennsylvania
Mourning dove	*Zenaida macroura*	New Jersey
Northern cardinal	*Cardinalis cardinalis*	New Jersey
Northern flicker	*Colaptes auratus*	New Jersey
Northern mockingbird	*Mimus polyglottos*	New Jersey
Pileated woodpecker	*Dryocopus pileatus*	Pennsylvania
Red-bellied woodpecker	*Melanerpes carolinus*	Pennsylvania
Red-headed woodpecker a/	*Melanerpes erythrocephalus*	New Jersey
Red-tailed hawk	*Buteo jamaicensis*	Pennsylvania
Red-winged blackbird	*Agelaius phoeniceus*	Pennsylvania
Ruffed grouse	*Bonansa umbellus*	Pennsylvania
Rufous sided towhee	*Pipilo erythrophthalmus*	New Jersey
Savannah sparrow a/	*Passerculus sandwichensis*	New Jersey
Song sparrow	*Melospiza melodia*	New Jersey
Tufted titmouse	*Baeolophus bicolor*	Pennsylvania and New Jersey
Turkey, eastern wild	*Melagris gallopavo silvestris*	Pennsylvania
Turkey Vulture	*Cathartes aura*	New Jersey
Vesper sparrow a/	*Pooecetes gramineus*	New Jersey
White-breasted nuthatch	*Sitta carolinensis*	Pennsylvania
Wood duck	*Aix sponsa*	Pennsylvania
Wood thrush	*Hylocichla mustelina*	Pennsylvania
Yellow warbler	*Setophaga petechia*	New Jersey

TABLE 4.5.2-1 Wildlife Species Observed along the Project		
Common Name	**Scientific Name**	**State**
Amphibians		
American toad	*Bufo americanus*	Pennsylvania
Bullfrog	*Rana catesbeiana*	Pennsylvania
Gray treefrog	*Hyla versicolor*	Pennsylvania
Green frog	*Rana clamitans melanota*	Pennsylvania and New Jersey
Northern leopard frog	*Lithobates pipiens*	Pennsylvania
Spring peeper	*Pseudacris crucifer*	Pennsylvania
Wood frog	*Rana sylvatica*	Pennsylvania
Reptiles		
Box turtle a/	*Terrapene carolina*	New Jersey
Eastern box turtle	*Terrapene carolina carolina*	Pennsylvania
Eastern garter snake	*Thamnophis sirtalis*	Pennsylvania
Timber rattlesnake a/	*Crotalus horridus*	Pennsylvania
Wood turtle	*Clemmys insculpta*	Pennsylvania
Fish		
Trout sp.	*Salvelinus sp.*	Pennsylvania

Notes:
a/ State listed or candidate species
b/ Federal-threatened species
c/ Flyover
d/ Observed in both states but only listed in New Jersey

Unique or Exemplary Wildlife Habitats

The Project would cross several areas identified as potentially supporting Vegetative Communities of Concern (these areas are discussed in detail within section 4.5.1.1). This section discusses only those communities or designated areas that we consider to have significant and unique importance to wildlife species and currently support a diverse wildlife assemblage.

Bear Creek Preserve

The Bear Creek Preserve is a 3,400-acre property owned by the Natural Lands Trust in Luzerne County, Pennsylvania that contains extensive wetland habitats that can support wetland dependent wildlife species (see section 4.5.2.1). The Project would cross the Bear Creek Preserve between MPs 19.7 to MP 21.5. Penn East would employ measures to avoid and minimize impacts on wetland habitats in this area, such as limit construction activity and ground disturbance in wetland areas, clearly mark wetland boundaries and buffers, locating ATWS at least 50 feet from wetland boundaries, and not storing hazardous materials within 100 feet of any wetland (see Section 4.4 – Wetlands, for more details)

Sourland Mountain Region

The Sourland Mountain region comprises the largest contiguous forests in central New Jersey. It is sparsely populated and contains a complex ecosystem of forest, wetlands and grasslands. As a result, it supports a rich diversity of plant and animal species. The Project would cross the Sourland region between MPs 100.4 and 108.3. We received comments expressing concern that the Project would degrade and/or fragment habitats within the Sourland Mountain region. To reduce fragmentation of undisturbed forested areas in the Sourland Mountains region and minimize impacts on wildlife species, the pipelines was routed adjacent to or in proximity to an existing utility right-of-way within the Sourland Mountain region.

Milford Bluffs

At one time, the Project would have impacted the Milford Bluffs area (i.e., an areas that contains steep shale cliffs and woodlands along the edge of the Delaware River); however, the proposed route has been altered to avoid this area.

State Game Lands

In Pennsylvania, State Game Lands (SGLs) are managed for the protection, propagation, and preservation of game species and other wildlife species (Jacobson et al. 2010). The PGC manages 305 SGLs, four of which are crossed by the proposed Project. These include SGL numbers 91, 40, and 129 located in the northeastern management region, as well as SGL number 168 which is located in the southeastern management region. Each SGL that would be crossed by the pipeline in Pennsylvania is summarized in Appendix G-14 and discussed in more detail within section 4.7.

Wildlife Management Areas and Deer Management Areas

In New Jersey, the NJDEP-DFW manages Public Hunting Lands and Wildlife Management Areas (WMAs). While the proposed pipeline would not cross any WMAs, there are some Deer Management Areas that would be crossed. These areas allow hunting of white-tailed deer on these properties and are subject to local restrictions and regulations. There is also potential for wild turkey (Meleagris gallopavo) to be found within these areas due to the presence of suitable habitat.

Important Bird Areas

The Project would cross through multiple Important Bird Areas (IBAs). IBAs are identified by the National Audubon Society and serve to identify and conserve areas that provide critical habitat for birds. The Project would cross through the following IBAs: Hickory Run State Park IBA, Kittatinny Ridge IBA, Musconetcong Gorge IBA, Everittstown Grassland IBA, Baldpate Mountain IBA, and Pole Farm IBA (see Table 4.5.2-2). We received comments expressing concern about the Project impacts on the Green Pond Marsh IBA in Pennsylvania; however, the Green Pond Marsh IBA would not be crossed or affected by the Project. These IBAs are discussed in more detail within section 4.5.2.3

TABLE 4.5.2-2

Important Bird Areas Crossed by the Project

IBA	Description	MP Crossed
Hickory Run State Park	This IBA includes a large area of contiguous forest. This area is valued for providing interior forest habitat for a number of songbirds.	MPs 27.0 to 31.5 in PA
Kittatinny Ridge	This IBA is a primary raptor migration corridor in the northeastern United States.	MPs 48.8 to 54.0 in PA
Musconetcong Gorge	This IBA consists of a mix of cultivated and fallow fields, which provide habitat for a wide array of breeding grassland birds	MPs 77.7 to 78.3; and 78.4 and 84.2 in NJ

TABLE 4.5.2-2 Important Bird Areas Crossed by the Project		
IBA	Description	MP Crossed
Everittstown Grassland	This IBA consists of a mix of cultivated and fallow fields.	MPs 85.9 to 86.3; and 87.4 and 88.4 in NJ
Baldpate Mountain	This IBA is part of the Sourland Mountain region. This area is characterized by relatively steep, rocky and mostly forested slopes and includes orchards, fallow fields and a small man-made pond associated with an old farmstead. A wide variety of breeding landbirds utilize this site as stopover habitat during migration.	MPs 101.3 and 108.4 in NJ
Pole Farm	While a small portion of this IBA is leased to farmers, the majority of the fields are native grasslands, shrublands, and second growth forests.	MPs 113.5 and 114.0 in NJ

4.5.2.2 General Impacts and Mitigation

Forested areas would be the most common habitat type affected by the Project (consisting of approximately 38 percent of the Project's impacts), followed by agricultural areas, residential/ industrial/commercial areas, open lands, and lastly open water (see table 4.7.1-1).

The impact of Project construction and operation on terrestrial wildlife species and their habitats would vary depending on the timing of construction, types of construction techniques used, the habitat and life-history requirements of each species affected, and the type and extent of habitats that would be impacted. Direct impacts on wildlife during construction could include the displacement of wildlife from the Project area, as well as direct mortality of some individuals. Individuals of some wildlife species may be directly affected by construction of the Project if they are killed by vehicles and construction equipment traveling to, from, or within the construction sites. Species most susceptible to vehicle-related mortality include those that are inconspicuous (e.g., salamanders, frogs, snakes, small mammals), those with limited mobility (e.g., amphibians, as well as young individuals of any taxa), burrowing species (e.g., mice and voles, weasels, frogs and toads, snakes, subterranean mollusks, and burrowing avian species), and wildlife with behavioral activity patterns that can make them vulnerable to vehicular collisions (e.g., deer are more active at dusk and dawn when light levels are low and collisions are more likely to occur, and some wildlife scavenge roadside carrion making them more susceptible to collisions with vehicles [Leedy 1975; Bennett 1991; Forman and Alexander 1998; Trombulak and Frissel 2000]).

Some species are likely to be displaced from habitats that are cleared of vegetation as well as from areas adjacent to construction sites due to construction noise and visual disturbances. Displacement from adjacent habitats would most likely be a temporary effect during construction of the Project, and it is expected that most wildlife would return to the area after restoration of the right-of-way is complete. However, if adjacent habitats are at carrying capacity for the species, displaced individuals could be adversely affected due to increased competition for resources, increased susceptibility to predation, or disease that may be facilitated by over-crowding. This may decrease individuals' reproductive success by increasing nest abandonment or interfering with breeding behaviors and success. These impacts may negatively affect population growth through diminished rates of survivorship and fecundity.

Because much of the area affected by the Project's construction would be restored to preconstruction habitat types (per the measures outlined in FERC's Plan and Procedures), impacts on wildlife species would generally be short-term. However, long-term impacts on terrestrial wildlife could occur in forested areas due to the time required to restore the forested habitat to its preconstruction condition (see section 4.5.1.2 for details).

Construction of ancillary facilities (i.e., M&R stations, MLV sites, pig launcher/receiver, and a compression station) would have minor temporary, short-, and long-term impacts on wildlife habitat, causing localized impacts on wildlife populations. During construction, the clearing and grading of the aboveground facilities may result in mortality to less mobile forms of wildlife, such as small rodents and reptiles (as discussed above). These ancillary facilities would be permanent structures and would result in a permanent loss of vegetative cover. These ancillary facilities would provide minimal habitat for wildlife; however, they are minor in terms of the extent/scope of the entire Project's total disturbance, making up less than 5 percent of Project's total affected area.

During pipeline operation, indirect impacts on wildlife populations could result through habitat alteration (e.g., cleared and maintained habitats). Direct mortality of species could also occur during right-of way maintenance operations (e.g., individuals being struck by vehicles or killed during maintenance mowing of the right-of-way). Direct impacts during operation could also result from operational noise at the compressor station. The distance at which the disturbance effect from this noise would abate is dependent on the tolerance levels of the species in the area, the background noise levels in the area, as well as the vegetation and topographic conditions of the area (e.g., thick vegetation, mountains, and rolling topography can block the propagation of noise; see section 4.10).

Long-term habitat impacts could result from a permanent shift in vegetation structure, primarily where trees would be prevented from occupying the permanent pipeline right-of-way during operation of the Project. Creation of a permanent pipeline right-of-way would permanently convert forested habitats to early seral[17] vegetation stages. The trees removed by clearing would be replaced by herbaceous species, shrubs, and small trees, which may provide seeds and foliage as food for terrestrial mammals and birds, as well as habitat for ground-nesting birds and mammals. Where preconstruction conditions were similar (e.g., where the permanent right-of-way crossed through an area that was originally an open or agricultural habitat), the effects of the permanent right-of-way on these habitat would be minimal. On the other hand, where the construction impacts change species composition or habitat structure to a substantial degree (e.g., in previously forested habitats), wildlife that are closely associated with the original conditions of the area may respond by shifting activity to habitats that provide better support (e.g., forest dependent species may no-longer use these modified habitats).

Forest fragmentation caused by the new right-of-way can have negative effects on forest dwelling species (e.g., causing individuals to crowd into remaining patches of habitat) while it can have beneficial affects to species that thrive in edge habitats (Hay 1994, Pearce and Moran 1994, Roberts and Arner 1984). This can lead to increased competition for nesting habitat, breeding habitat, and food resources between forest dependent species and edge dominant species (Piatt et al. 2006). In extreme situations, the habitat openings can inhibit movement by certain wildlife species across the right-of-way (e.g., interior forest dependent species may not travel though the

[17] A seral community is an intermediate stage found in ecological succession in an ecosystem advancing towards its climax community.

open habitat that would be found on the right-of-way). The distance an edge effect extends into a forest/woodland is variable, but most studies point to at least 300 feet (Rodewald 2001; Ontario Ministry of Natural Resources 2000; Robbins 1988; Rosenberg et al. 1999).

About 44 miles of the proposed pipeline would be co-located with existing rights-of-way. Overall, the temporary construction areas of the right-of-way would be minimized to the extent practical (see the discussion in section 4.5.1 above). The mowing or clearing of vegetation would be rotated in a way that best allows for more beneficial wildlife habitat to become established. The initial schedule for the clearing of trees would be dictated by the bat timing restriction window (November 1 to March 31) or other state-mandated restriction for vegetation maintenance. Future mowing or clearing for maintenance of the right-of-way would occur between September 11 and March 14 in order to prevent impacts on grassland bird species that may be breeding and nesting in the vegetation (impacts regarding timing restrictions for threatened and endangered species are discussed in more detail in section 4.6). In addition, the seed mixes that would be used for restoration of the temporary work areas of the Project would minimize competition with native wood plant species (seed mixes would be determined based on recommendations made by the local soil conservation district or land managing agency, such as the PGC or other applicable agencies). This would allow native species to become re-established and for native wildlife species to continue using the restored habitat.

4.5.2.3 Migratory Birds and the Bald and Golden Eagle Protection Act (Impacts and Mitigation)

Section 703 of the MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the U.S. Department of the Interior. The BGEPA prohibits harming eagles, their nests, or their eggs. The National Bald Eagle Management Guidelines are intended to ensure that project actions avoid injury, decreased productivity, or nest abandonment. For example, the guidelines recommend buffers around nests to screen nesting eagles from noise and visual distractions caused by human activities.

On March 31, 2011, FERC and the FWS signed an MOU that identifies specific activities where cooperation between FERC and FWS would contribute to the conservation of migratory birds and their habitat, and outlines a collaborative approach to promoting the conservation of migratory bird populations and furthering implementation of the migratory bird conventions, the MBTA, and the BGEPA.

PennEast was provided with a list of migratory bird species of special concern by the FWS for Pennsylvania, and a list for New Jersey utilizing the Information Planning and Conservation (IPaC) database. There are 22 species listed by the FWS as migratory birds of concern that were identified as being likely to occur within the Project area. These include: American bittern (*Botaurus lentiginosus*), American oystercatcher (*Haematopus palliates*), bald eagle, black-billed cuckoo, blue-winged warbler (*Vermivora cyanoptera*), Canada warbler (*Cardellina canadensis*), cerulean warbler (*Setophaga cerulean*), golden-winged warbler (*Vermivora chrysoptera*), Kentucky warbler (*Geothlypis formosa*), least bittern (*Ixobrychus exilis*), Louisiana waterthrush (*Parkesia motacilla*), peregrine falcon (*Falco peregrinus*), pied-billed grebe (*Podilymbus podiceps*), prairie warbler (*Setophaga discolor*), purple sandpiper (*Calidris maritima*), red-headed woodpecker, rusty blackbird (*Euphagus carolinus*), short-eared owl (*Asio flammeus*), snowy egret

(*Egretta thula*), red knot (*Calidris canutus*), wood thrush, and worm-eating warbler (*Helmitheros vermivorum*). Of these, four species (i.e., bald eagle, black-billed cuckoo, red-headed woodpecker, and wood thrush) have been observed within the Project area during field work conducted by PennEast.

The NJDEP-ENSP has requested that PennEast survey specifically for migratory birds (including breeding species, marsh birds, and raptors) on public lands in New Jersey (NJDEP-ENSP 2015). Currently, PennEast has only been able to survey a portion of the Project area (approximately 7 percent) due to lack of survey access permission granted by affected landowners. If the Commission decides to authorize the Project, the Certificate would grant PennEast the right to pursue access through eminent domain, at which time PennEast would complete the necessary remaining field surveys.

The proposed Project would cross the following IBAs, as designated under the IBA program:

- *Hickory Run State Park*: This IBA includes a large area of contiguous forest. This area is valued for providing interior forest habitat for a number of songbirds (such as prairie warbles and eastern bluebirds). The Project would cross through this IBA between MPs 27.0 and 31.5 in Carbon County, Pennsylvania. The Project would impact about 29.7 acres of this IBA during construction, and about 27.5 during operations.
- *Kittatinny Ridge*: This area is a primary raptor migration corridor in the northeastern United States. A number of other, non-raptor species also use this corridor for migration including ruby-throated hummingbirds and monarch butterflies. Hawk Mountain Sanctuary located on the Kittatinny Ridge has 16 documented regular migrant species that occur in this area, including sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk, American kestrel, red-shouldered hawk (*Buteo lineatus*), and merlin (*Falco columbarius*). Another 140 non-raptor bird species have been documented as using this area for regular migration as well. Additionally, this IBA provides forest interior birds with vital nesting habitat. The Project would cross through this IBA between MPs 48.8 and 54.0 in Carbon and Moore Counties, Pennsylvania; and would result in about 50.4 acres of construction impacts, and 30.9 acres of operational impacts on this IBA.
- *Baldpate Mountain*: This IBA is part of the Sourland Mountain region (previously discussed in section 4.5.1 above as well as in section 4.7 - Land Use). This area is characterized by relatively steep, rocky and mostly forested slopes and includes orchards, fallow fields and a small man-made pond associated with an old farmstead. A wide variety of breeding landbirds utilize this site as stopover habitat during migration (New Jersey Audubon 2014b). In addition, the deciduous forests located within this IBA provide breeding habitat for the state-endangered red-shouldered hawk, as well as the state-special concern Cooper's hawk. Other species that utilize this forest for breeding include yellow-billed cuckoos (*Coccyzus americanus*), chimney swifts (*Chaetura pelagica*), northern flickers, eastern wood pewees (*Contopus virens*), Kentucky warblers, wood thrushes, and gray catbirds. Several species that utilize the scrub-shrub habitat located here include eastern wild turkeys, pine warblers (*Setophaga pinus*), prairie warblers, and eastern towhees. Conservation of priority species occurring in this area includes the projection of hairy woodpeckers, Carolina chickadees, and brown creepers. The Project would cross through this IBA between MPs 101.3 and 108.4 in Hunterdon and Mercer Counties, New

Jersey. The Project would result in approximately 71.4 acres of construction impacts and 43.0 acres of operational impacts on this IBA.

- *Musconetcong Gorge*: This IBA consists of 4,174 acres in Hunterdon County and includes a mix of cultivated and fallow fields, providing habitat for a wide array of breeding grassland birds. These birds include state-endangered vesper sparrows, state-threatened grasshopper sparrows (*Ammodramus savannarum*), bobolinks, savannah sparrows, American kestrels, and state-special concern eastern meadowlarks (New Jersey Audubon 2014b). The Project would cross through this IBA between MPs 77.7 and 78.3 as well as MPs 78.4 and 84.2 in Hunterdon County, New Jersey, and would result in approximately 62.2 acres of construction impacts and 41.9 acres of operational impacts on this IBA.
- *Pole Farm*: This IBA consists of 1,602 acres in Mercer County and is considered to be extremely important habitat for the Northern harrier (a state species of concern). While a small portion of this property is leased to farmers, the majority of the fields are native grasslands, equating to approximately 435 acres of grassland (including wet meadows), and about 380 acres of shrub land and second growth forest (New Jersey Audubon 2014b). The Project would cross through this IBA between MPs 113.5 and 114.0 in Mercer County, New Jersey, and would result in approximately 4.2 acres of construction impacts and 2.9 acres of operational impacts on this IBA.
- *Everittstown Grassland*: This IBA is located in Hunterdon County, New Jersey and is 4,174 acres in size. Primary habitat includes a mix of cultivated and fallow fields. The grasslands of this site provide important habitat for an exceptional diversity of breeding grassland birds. Nesting birds include state-endangered vesper sparrows, state-threatened grasshopper sparrows, bobolinks, savannah sparrows, American kestrels, and state-special concern eastern meadowlarks (NJ Audubon, 2014b). The Project would cross through this IBA between MPs 85.9 and 86.3 as well as between MPs 87.4 and 88.4 in Hunterdon County, New Jersey. The Project would result in approximately 13.1 acres of construction impacts and approximately 7.7 acres of operational impacts on this IBA.

The potential impacts on migratory birds would be similar to those discussed above for general avian species, and include mortality or injury, disruption and disturbance, loss of habitat, and displacement from adjacent habitats (see previous discussions above). PennEast would be required by the FWS to take measures to avoid and minimize the taking of birds (as defined by the MBTA and BGEPA). As a result, **we recommend that**:

- **<u>Prior to construction</u>, PennEast should file with the Secretary a Migratory Bird Conservation Plan developed in consultation with the FWS, along with documentation of consultation with the FWS.**

PennEast has committed to following the FWS' recommendations for implementation (Project wide in both states) regarding adaptive management practices in order to conserve migratory birds during construction and operation of the Project. These measures include:

- Where disturbance is necessary, clear natural or semi-natural habitats (e.g., forests, woodlots, reverting fields, shrubby areas) and perform maintenance activities (e.g., mowing) between September 1 and March 31, which is outside the nesting season for most native bird species. Without undertaking specific analysis of breeding species and their respective nesting seasons on the Project site, implementation of this seasonal restriction would avoid take of most breeding birds, their nests, and their young (i.e., eggs, hatchlings, fledglings).

- Minimize land and vegetation disturbance during Project design and construction. To reduce habitat fragmentation, co-locate roads, fences, lay down areas, staging areas, and other infrastructure in or immediately adjacent to already-disturbed areas (e.g., existing roads, pipelines, agricultural fields) and cluster development features (e.g., buildings, roads) as opposed to distributing them throughout land parcels. Where this is not possible, minimize roads, fences, and other infrastructure.
- Avoid permanent habitat alterations in areas where birds are highly concentrated. Examples of high concentration areas for birds are wetlands, State or Federal refuges, Audubon IBA, private duck clubs, avian staging areas, rookeries, leks, roosts, and riparian areas. Avoid establishing sizable structures along known bird migration pathways or known daily movement flyways (e.g., between roosting and feeding areas).
- Conserve area-sensitive species, avoid fragmenting large, contiguous tracts of wildlife habitat, especially if habitat cannot be fully restored after construction. Maintain contiguous habitat corridors to facilitate wildlife dispersal. Where practicable, concentrate construction activities, infrastructure, and man-made structures (e.g., buildings, cell towers, roads, parking lots) on lands already altered or cultivated, and away from areas of intact and healthy native habitats. If not feasible, select fragmented or degraded habitats over relatively intact areas.
- Develop a habitat restoration plan for the proposed site that avoids or minimizes negative impacts on birds, and that creates functional habitat for a variety of bird species. Use only plant species that are native to the local area for revegetation of the Project area.

Although the FWS requested that tree clearing activities only be conducted between September 1 and March 31 (i.e., times outside of the typically avian breeding season), PennEast has committed to only conducting tree clearing activities to a narrower timeframe (November 1 and March 31) in order to protect native bat species. This commitment would minimize impact from vegetation clearing on both avian and bat species (see section 4.6.1.1 for more details regarding potential impacts and minimization measures for bat species).

In the event that migratory bird's eggs or chicks (nestlings or fledglings) are found out of a nest during construction, PennEast would take the following actions. PennEast would contact the FWS immediately during normal business hours. If eggs or chicks can be salvaged (i.e., if not cracked or dead), then they would be taken to a federal or state permitted wildlife rehabilitation center by a person authorized to handle migratory birds. The EI would maintain a log of MBTA bird salvage efforts, including unintentional mortalities and individuals transferred to wildlife rehabilitation care facilities. PennEast would file a report with the FWS within 24 hours of an occurrence.

Based on the measures described above, as well as the ongoing consultation with the FWS (see our recommendation above for PennEast to work with the FWS to develop a Migratory Bird Conservation Plan) we believe that the Project would be in compliance with the MBTA and the BGEPA.

Bald Eagles

Bald eagles are protected under the BGEPA. They are also listed as endangered in New Jersey, and have been relisted from "threatened" to "protected" in Pennsylvania. They are raptors with a characteristic white head and tail, and black body plumage. They primarily feed on fish; however their diet can also include smaller birds, mammals and reptiles. Important habitat for this species include areas of low human development with large areas of open water with abundant of prey and forested areas with large mature canopy trees for perch hunting, roosting, and nesting. Breeding activities for these birds include courtship, nest building, egg laying, incubation, and hatching, rearing and fledging of young. Breeding and nest building can occur one to three months prior to egg laying. For birds occurring in both Pennsylvania and New Jersey, egg laying and incubation typically occurs between January and the end of March and young stay in the nest until they are approximately 8 to 14 weeks old when they fledge. Bald eagles have high nest fidelity and typically return to the same nesting sites every year.

PennEast conducted habitat screening for bald eagles in accordance with the National Bald Eagle Management Guidelines (FWS 2007b). Based on this as well as information provided by the FWS, six eagle nests were identified near the Project area -- four in Pennsylvania and two in New Jersey. The closest of these nests is located approximately 3,170 feet from the Project at approximately MP 79.

PennEast has committed to following the following guidelines regarding bald eagles, as requested by the FWS:

- A linear distance buffer of at least 330 feet (100 meters) would be maintained between areas with active construction and eagle nests (including alternate nests that are not actively used that year). If an existing activity that is similar in kind and size is closer than 330 feet and has been tolerated by eagles, the distance buffer for the PennEast construction activity would be the same or greater than that of the existing tolerated activity;
- Within 660 feet of an eagle nest, all activities that may disturb bald eagles would be avoided from January 1 to July 31 (the breeding season). These activities include, but are not limited to: construction, excavation, use of heavy equipment, use of loud equipment or machinery, vegetation clearing, earth disturbance, planting, and landscaping;
- Established landscape buffers that screen the activity from an eagle nest would be maintained;
- From January 1 to July 31, blasting and other activities that produce extremely loud noises would not occur within 1/2 mile of active eagle nests, unless greater tolerance to the activity (or similar existing activity) has been demonstrated by the eagles in the breeding area; and
- Construction activities in New Jersey would be subject to FWS-NJ timing restrictions for known eagle nest locations, or from December 15 through July 31.

By adhering to these guidelines and timing restrictions PennEast would avoid impacts on bald eagle while nesting is occurring, as well as comply with the requirements of the BGEPA.

4.6 THREATENED, ENDANGERED, AND SPECIAL STATUS SPECIES

Section 7 of the ESA (19 U.S.C 1536(c)), as amended, requires that any actions authorized, funded, or carried out by a federal agency do not jeopardize the continued existence of a federally listed endangered or threatened species, or result in the destruction or adverse modification of federally listed designated critical habitat. The action agency is required to consult with the FWS and/or NMFS to determine whether federally listed endangered or threatened species or designated critical habitat are found within the vicinity of the project, and to determine the proposed action's potential effects on those species or critical habitats. For actions involving major construction activities with the potential to affect listed species or designated critical habitat, the federal action agency must prepare a Biological Assessment for those species that may be affected. The action agency must submit its BA to the FWS and/or NMFS and, if it is determined that the action is "likely to adversely affect" a listed species, the federal agency must submit a request for formal consultation to comply with section 7 of the ESA. In response, the FWS and/or NMFS will issue a Biological Opinion as to whether or not the federal action would likely jeopardize the continued existence of a listed species, or result in the destruction or adverse modification of designated critical habitat.

PennEast, acting as the FERC's non-federal representative for the purpose of complying with section 7(a)(2) of the ESA, initiated informal consultation with the FWS and NMFS through correspondence on August 12, 2014, and continued with various follow-up correspondence as the pipeline route was modified, through October 7, 2015 (see appendix H). On September 18, 2014, NMFS replied stating that no threatened or endangered species under its jurisdiction are known to occur in the Project area, and no further consultation is necessary with NMFS (NMFS 2014). However, the PFBC indicated that two federally listed sturgeon species (which are also state listed) are known to occurring within the Delaware River (PFBC 2014). These species occur about 20 river-miles downstream of the Project. In response to the PFBC's comment, these two listed sturgeon species are included in this EIS; however, the analysis in this EIS supports the NMFS statement that these two listed fish species do not occur within the Project area.

In compliance with section 7 of the ESA, FERC staff must prepare a BA for the Project for submission to the FWS and NMFS. The BA details the environmental baseline for federally listed species and designated critical habitat; assess the direct, indirect, interdependent and interrelated, and cumulative effects of the Project; detail the proposed conservation measures; and provide a determination of effect. Because some species surveys are still pending or are only partially complete due to lack of access to certain areas where the land-owner/manager has not granted PennEast access, our final effects determination of species cannot be made at this time. Our preliminary determination of effect on listed species is included in this EIS. FERC request's that the FWS consider this EIS as the BA.

Pennsylvania and New Jersey have enacted laws to designate and protect state listed species. In Pennsylvania, this state law is referred to as the Endangered Species Coordination Act (under Pennsylvania House Bill 1576); while the applicable state law is referred to as the Endangered Species Conservation Act of 1973 in New Jersey. This EIS provides information related to impacts on state listed species in compliance with these state laws.

PennEast has conducted surveys for federal and state listed species within portions of the Project's route (surveys were conducted within a 400-foot corridor around the Project); however, as stated above surveys have yet to be completed for all potential suitable habitats for federal and state listed species (see appendix G-13). If the Commission decides to authorize the Project, the Certificate would grant PennEast the right to pursue access through eminent domain, at which time PennEast would complete the necessary remaining field surveys.

The section describes the specific issues and measures applicable to threatened and endangered species.

4.6.1 Federally Listed Species

Species listed under the federal ESA as threatened or endangered are afforded the highest level of federal protection regarding limits on impacts on the species and habitats. Through informal consultation with the applicable federal agencies, five federally listed threatened or endangered species have been identified as potentially occurring in the Project area. These species include two mammals, one reptile, one invertebrate, and one plant species (FWS 2014a; FWS 2014b; NMFS 2014). The PFBC further identified two fish species that are listed under both the ESA and the state endangered species laws (the Atlantic sturgeon [*Acipenser oxyrinchus oxyrinchus*] and Shortnose sturgeon [*Acipenser brevirostrum*]) as potentially occurring downstream of the Project area (PFBC 2014); although the NMFS stated that these two listed fish species do not occur in the Project area and would not be impacted by the Project (NMFS 2014). Due to this comment by the PFBC, analysis of these two listed fish species, as well as information regarding their distribution in relation to the Project area are included in this EIS. The bald eagle (which is protected under the BGEPA) is discussed in section 4.5 - Wildlife.

There is no designated Critical Habitat for ESA listed species in the Project area (FWS 2014a).

The federally listed species that could occur within the Project area and our preliminary determination of effect are listed in table 4.6-1. Additional information on these species, including the extent of surveys that have been conducted to date, is listed in appendix G-13. A summary of each species follows.

TABLE 4.6-1

Federally Listed Species Potentially Occurring in the Vicinity of the PennEast Project

Species	Federal Status a/	State Status a/	Counties/ State/ Location in the Project Area	Preferred Habitat	Preliminary Determination	Survey Status as of May 2016
Mammals						
Indiana bat *(Myotis sodalist)*	E	E (PA, NJ)	All counties	Winter habitat consists of caves or mines. Summer roosting habitat consists of dead or dying trees, or trees with exfoliating bark.	*May affect, likely to adversely affect*	**PA**: Surveys complete **NJ**: 16 mist nest sites have yet to be surveyed in NJ (i.e., approximately 66 percent of areas requiring surveys in NJ have been surveyed)
Northern long-eared bat *(Myotis septentrionalis)*	T	SC (PA), PE (NJ)	All counties	Winter habitat consists of caves or mines. Summer roosting habitat consists of dead or dying trees, or trees with exfoliating bark.	*May affect, likely to adversely affect*	**PA**: Surveys complete **NJ**: 16 mist nest sites have yet to be surveyed in NJ (i.e., approximately 66 percent of areas requiring surveys in NJ have been surveyed)
Reptiles						
Bog turtle *(Glyptemys muhlenbergii)*	T	E (PA, NJ)	Carbon (Aquashicola drainage only) Northampton, and Bucks, counties PA; all counties in NJ	Wetland bogs that have deep organic soils, and a spring-fed hydrology. These wetlands are typically surrounded by an open canopy with a minimal presence of woody species.	*May affect, likely to adversely affect*	**PA**: Wetland delineation surveys are approximately 79 percent complete in PA. Phase 1 bog turtle surveys have been completed at all wetlands delineated to date. Phase 2 surveys were completed at 5 wetlands in 2015, while Phase 2 surveys are currently ongoing at one wetland. Phase 3 surveys are currently ongoing at one wetland. **NJ**: Wetland delineation surveys are approximately 29 percent complete in NJ. Phase 1 bog turtle surveys are pending access and completion of wetland delineations (approximately 53 percent of delineated wetlands in NJ have undergone Phase 1 bog turtle surveys). No Phase 2 surveys have been completed to date.
Invertebrates						
Dwarf wedgemussel *(Alasmidonta heterodon)*	E	E (PA, NJ)	Delaware River and tributaries	Regionally in the Delaware River, as well as some smaller tributaries of the Delaware River (with the smaller tributaries potentially being crossed by the Project using an open-cut crossing method)	*May affect, likely to adversely affect*	No surveys conducted to date. Surveys may be required in New Jersey by the NJDEP and FWS.

TABLE 4.6-1

Federally Listed Species Potentially Occurring in the Vicinity of the PennEast Project

Species	Federal Status a/	State Status a/	Counties/ State/ Location in the Project Area	Preferred Habitat	Preliminary Determination	Survey Status as of May 2016
Plants						
Northeastern bulrush *(Scirpus ancistrochaetus)*	E	E (PA)	Carbon & Northampton, PA	Small wetlands, sinkholes, or wet depressions.	Conditional "*May affect, not likely to adversely affect*" or "*May affect, likely to adversely affect*" depending on the feasibility of proposed avoidance measures to avoid wetland habitats	Surveys have been completed in all accessible wetlands that were delineated as 2015. Eight additional wetlands delineated near MP 26.9 will be surveyed in 2016. Wetland surveys are approximately 79 percent complete in PA.
Fish b/						
Atlantic sturgeon *(Acipenser oxyrinchus oxyrinchus)*	E and T[b]	E (PA, NJ)	Found in the Delaware River, but approximately 20 river-miles downstream of the Project area	Regionally in the Delaware River, with known occurrences located downstream of the proposed crossing (which would be crossed via a HDD method)	*No effect*	No surveys conducted or planned.
Shortnose sturgeon *(Acipenser brevirostrum)*	E	E (PA, NJ)	Found in the Delaware River, but approximately 20 river-miles downstream of the Project area	Regionally in the Delaware River, with known occurrences located downstream of the proposed crossing (which would be crossed via a HDD method)	*No effect*	No surveys conducted or planned.

Notes:
a/ E = endangered, T = threatened, SC = special concern, PE = proposed endangered.
b/ There are four distinct population segments (DPS) of the Atlantic sturgeon that are listed as endangered: the New York Bright DPS, the Chesapeake Bay DPS, the Carolina DPS, and the South Atlantic DPS; the Gulf of Maine DPS is listed as threatened. None of these DPS occur within the Project area, but the New York Bright DPS could occur downstream of the Project area.

4.6.1.1 Indiana Bat and Northern Long-Eared Bat

The Indiana bat is federally and state listed (by both Pennsylvania and New Jersey) as endangered. It was federally listed as endangered under the ESA on March 11, 1967 (32 FR 4001). It is a small insectivorous bat with grayish brown fur, weighing 0.25 ounce with a wingspan of 9 to 11 inches. Indiana bats hibernate during the winter in caves or occasionally abandoned mines, typically from November through March. Hibernacula need to be cool and humid with stable temperatures under 50° F, but still above freezing, and typically have large caverns with lengthy passages that can accommodate large volumes of bats (FWS 2006). In April and May, Indiana bats migrate to their summer roosting sites, which include dead or dying trees, or live trees with exfoliating bark. Roost trees may be in upland areas or floodplain forests and occasionally in manmade structures, such as sheds or bridges. Large trees of species such as shagbark hickory and white oak are often preferred roost sites. Reproductive females roost in trees that receive sunlight for most of the day, such as those within canopy gaps or along fencelines or wooded edges. Indiana bats also forage within wooded riparian corridors, along streams, and along forest edges (FWS 2007). The Project does not cross through any known bat hibernacula, swarming areas, or maternity colonies for the Indiana Bat.

The northern long-eared bat was listed by the FWS as threatened on April 2, 2015 (80 FR 17974), and the listing became effective on February 16, 2016 (81 FR 1900). This species is a medium-sized bat about 3-3.7 inches from head to tail with a wingspan of 9-10 inches and brown fur. As its name suggests, its distinguishing characteristic is its long ears. Northern long-eared bats spend winter hibernating in caves and mines, and during the summer they roost singly or in colonies underneath bark in cavities or crevices of live and dead trees (FWS 2015b). This species of bat is more of a habitat generalist than the Indiana bat, but their habitat requirements are similar. Therefore, habitat assessments and surveys for the two species often focus on the same areas and criteria. The FWS has identified three known hibernacula located within 0.25 mile of the Project (Shellenberger 2015), which are identified as Durham Cave 1, Durham Cave 2, and Tunnel 34. Cave 1 and Cave 2 are both located approximately 1,125 feet south of the pipeline route in the vicinity of MP 77.2. Tunnel 34 is located approximately 1,200 feet southwest of a Project access road and 6,100 feet west of the Project, in the vicinity of MP 11.3. Based on correspondences with the Pennsylvania Game Commission (Turner 2015) the only connection known to exist between the Cave 1 and Cave 2 is airflow. When these caves were last surveyed by the state in 2001, 34 bats were counted, 11 of which were northern long-eared bats while the remaining were non-listed bat species (Turner 2015).

PennEast has conducted surveys along portions of the Project for listed bat species in coordination with the FWS, NJDEP-DFW, and the PAGC (see appendix H and table 4.6-1). Project-specific surveys began on May 15, 2015, under the supervision of FWS-approved bat surveyors who were present at each site in order to positively identify captured bats. Mist net surveys were completed on August 15, 2015. No Indiana bats were captured during these surveys; however, 20 northern long-eared bats were captured (Wildlife Specialists 2015). Two sites in Pennsylvania and 16 sites in New Jersey could not be surveyed due to lack of access.

No direct impacts on mines and caves (i.e., habitats used as hibernacula by these listed bat species) are expected to occur as these habitats would not be directly crossed by the Project; however, indirect impacts are possible if construction were to occur in winter and early spring near mines or caves when bats are hibernating. Construction of the Project has the potential to disturb bats that may be occupying mines and caves located adjacent to the Project. Disturbed bats could flee the mines and caves, thereby using up limited bodily energy reserves that are critical during hibernation, potentially resulting in mortality. The FWS has concluded that a 0.25-mile buffer around mines and caves provides adequate protection from indirect impacts (e.g., disturbance and disruption) to hibernacula and hibernating colonies (FWS 2015a), and that no clearing of trees is allowed within 0.25 mile of hibernacula and that any Project activity with the potential to impact bats such as filling, excavation, blasting, noise, or the production of smoke should be restricted within this 0.25-mile buffer area. In order to minimize impacts on bat hibernacula, PennEast has modified the pipeline route near MP 9.0 to avoid a known mine and quarry that could support these listed bat species. PennEast has also re-routed the Project away from a known northern long-eared bat maternity colony in the vicinity of MP 108. These pipeline route changes would avoid or reduce potential impact of the Project on ESA listed bat species in these areas. However, the Project would be located within 0.25 mile of other known hibernacula and hibernating colonies at three locations (i.e., at Durham Cave 1 and Durham Cave 2 at MP 77.2, and Tunnel 34 at MP 11.3); and additional unidentified mines and caves may also be present along the Project. As a result, the Project is not consistent with the FWS requirement to avoid bat hibernacula by at least 0.25 mile; therefore, **we recommend that**:

- **<u>Prior to the end of the draft EIS comment period,</u> PennEast should file with the Secretary the measures or changes that it would implement to the Project's design in order to ensure that the Project is consistent with the FWS requirement to avoid all bat hibernacula by at least 0.25 mile. PennEast should also provide documentation of the consultation with the FWS on this restriction.**

The Indiana bat and northern long-eared bat occupy forested habitats where they roost and forage. Construction of the Project would disturb a total of approximately 633 acres of forested habitats (see Section 4.5), which could potentially support these bat species. Young bats or those that are unable to fly could be killed during tree clearing activities, if roost trees are felled during construction. In addition, bats are sensitive to disturbance and may abandon disturbed roosts trees, if possible, to avoid construction activities. This disturbance and subsequent abandonment could have energetic repercussions, potentially decreasing the likelihood of successful reproduction and survival. To minimize the potential impact that tree clearing could have to ESA listed bat species, PennEast has committed to following the FWS-required timing restrictions for tree clearing, between November 1 and March 31, in locations deemed appropriate by the FWS (which the FWS would likely base on bat concentrations identified during surveys). Additionally, PennEast has agreed to follow the recommendation made by PGC to only harvest/clear tree species greater than 5-inch dbh between November 1 and March 1 (PGC 2014; Taucher 2014).

PennEast has requested that the FWS verify the locations of where bat timing restrictions on tree clearing would apply. The preliminary list developed by PennEast includes MPs 1.5, 24, 35.8-35.9, 38.7, 39.6, 42.2, 49.4-50.4, 62.8, 82, 84.5, 88.6, and 102.8; however, the FWS would likely base their recommended locations for these timing restrictions in part on the final Project specific survey results. Because locations where tree clearing timing restrictions apply would likely depend on survey results, and not all surveys would be completed until after survey access is granted (if the Project is approved), **we recommend that**:

- **<u>Prior to construction,</u> PennEast should file with the Secretary a list of locations by milepost (MP) where the FWS would require tree clearing restrictions that are specifically applicable to federally listed bat species.**

The Project also has the potential to impact listed bat species during operation. Noise, visual, and ground-vibration disturbance would occur during certain operation and maintenance-related activities (e.g., during routine inspections of the line). Potential disturbance to listed bat species could occur during ongoing maintenance activities, and disturbances to bats can result in individuals fleeing the area thereby using up critical limited energy reserves, potentially resulting in mortality (see discussion above for construction related impacts).

Because all potentially suitable habitats for the Indiana bat and northern long-eared bat have not been surveyed to-date, it is possible that unidentified habitats for these bat species occur along the Project's proposed disturbance footprint. As a result, we have recommended that surveys for listed species (including the Indiana bat and northern long-eared bat) be completed within all potential suitable habitats that could be impacted by the Project prior to construction and that no Project related activities occur until consultation with the FWS is completed (see section 4.6.1.6). Implementation of the proposed timing restriction on tree clearing (discussed above) would minimize the potential extent of impacts on ESA listed bat habitats, including any habitats that are identified during pre-construction surveys; however, impacts on bats at mines and caves are still possible. In addition, the Project would impact forested habitats that could be used as foraging or roosting habitats. As a result, the Project *may affect and is likely to adversely affect ESA listed bat species.*

Consultation with the FWS is ongoing regarding ESA listed species, and as part of this ongoing consultation process the FWS may develop additional measures beyond those described in this EIS to avoid or minimize impacts on ESA listed species. See section 4.6.1.6 for our conclusion and recommendation regarding ongoing consultation.

4.6.1.2 Bog Turtle

The bog turtle is native to the eastern United States and ranges from Georgia to the lower New England states. It is listed as threatened under the ESA (62 FR 59605; November 4, 1997) and endangered by the states of Pennsylvania and New Jersey. Bog turtles inhabit distinct types of wetland habitats that include spring-fed hydrology and mucky soils. Clear groundwater with rivulets (i.e., a very small stream) and shallow pockets of surface water typify the hydrology of bog turtle wetlands, and subterranean tunnels with flowing water are used by bog turtles both in winter for hibernation and during the hot summer months. Deep, organic, mucky soils in which bog turtles can burrow are an important component of their habitat. An open canopy with minimal woody species is also important to allow for sufficient sunlight for basking and nesting, though some shrubs and small trees may be scattered throughout a predominantly emergent wetland. Bog turtles can sometime be found hiding among the roots of woody plant species such as willows and alders. Bog turtles typically emerge from hibernation in late March or early April, and return to hibernacula in late October, depending on weather conditions. Breeding occurs from late April through early June, with nesting typically occurring from June through early July. Eggs are laid within the top of vegetation such as tussock sedge or sphagnum moss. Hatchlings emerge from the nest from August through September and overwinter near their nest (PFBC 2011).

PennEast conducted habitat surveys for bog turtles and their habitat in accordance with federal bog turtle survey guidelines, as established by the FWS Bog Turtle Recovery Plan (FWS 2001). PennEast's plans to conduct Phase 1 surveys for bog turtles within all delineated wetlands within the 400-foot survey corridor around the Project, then conduct a Phase 2 survey in any wetland that was identified as potential bog turtle habitat during the Phase 1 surveys (as outlined in the FWS Bog Turtle Recovery Plan). Phase 1 surveys have been conducted within all delineated wetlands within Pennsylvania where access by the land-owner/manager was granted. Phase 1 surveys have been completed in 26 of the 52 total wetlands that have been delineated in New Jersey. Of the surveyed wetlands in Pennsylvania, seven met the field criteria (i.e., vegetation, hydrology and soils) to be considered potential bog turtle habitat, while two met the field criteria to be considered potential bog turtle habitat in New Jersey. Phase 2 surveys are currently on-going in the wetland areas that were identified as potential bog turtle habitats. While potential bog turtle habitat exists along the Project area, no bog turtles have been identified during these surveys.

Construction of the Project within wetland habitats has the potential to impact bog turtles. If present during construction, bog turtles could be directly injured or killed by construction equipment, or disturbed due to the presence of humans and machines in the area. In addition, construction and operation of the Project could alter wetland habitats that support this species. As discussed in detail within Sections 4.4 and 4.5, construction of the Project has the potential to alter wetland hydrology, increase the risk of invasive plant establishment/spread, and can fragment habitats. PennEast would be required to follow the FERC's Plan and Procedures which would minimize the effects of potential altered wetland hydrology, invasive plant establishment/spread, and fragmentation; however, the measures outline in these plans would not completely prevent all risks of invasive plants or fragmentation, and wetland hydrology would likely be temporarily altered during construction (see Section 4.4 and 4.5). Impacts from invasive plants and habitat fragmentation have been identified as two of the primary factors that currently threaten this listed species (NRCS 2016; PFBC 2016). For example, fragmentation of connected wetlands limits the bog turtle's ability to find mates and new habitat, and increases the amount of edge around the wetlands. This increased edge provides habitat for predators and increases the likelihood of invasion by non-native and non-wetland plants, which can compete with native wetland plants and degrade the habitat quality of the wetland for native species.

Because the Project would cross potential bog turtle habitat and could have impacts on this species, **we recommend that**:

- **<u>Prior to construction</u>, PennEast should file with the Secretary a bog turtle plan developed in coordination with the FWS that includes avoidance, minimization, and mitigation measures to minimize impact on bog turtles and their habitat, and describes measures that would be used during construction and operation to avoid direct and indirect impacts on bog turtles.**

Although no bog turtles have been found during Project-specific surveys, the Project would cross through and impact potential bog turtle habitat (including habitats in unsurveyed areas), and bog turtles could be present in unsurveyed areas. As a result, the Project *may affect and is likely to adversely affect* bog turtles.

Consultation with the FWS is ongoing regarding ESA listed species, and as part of this ongoing consultation process the FWS may develop additional measures beyond those described in this EIS to avoid or minimize impacts on ESA listed species. See section 4.6.1.6 for our conclusion and recommendation regarding ongoing consultation.

4.6.1.3 Dwarf Wedgemussel

The dwarf wedgemussel is a federal (55 FR 9447) and state-listed endangered freshwater mussel that occurs in the Delaware River and its sub-basins. This species was identified by the PFBC as potentially occurring in the portion of the Project that intersects with the Delaware River and its tributaries (PFBC 2014), but was not included on the list provided by the FWS of federally listed species potentially occurring in the Project area (FWS 2014a, 2014b). This species is rarely greater than 1.5 inches in length. It prefers muddy sand to sand and gravel/pebble river bottoms and creeks with slow to moderate currents. Additionally, they prefer relatively shallow, clean water with low levels of silt deposition. The adults are filter-feeders that strain plankton, bacteria, and other particles from the water column. The larval stage of this species is parasites that feed on host fish. Fish species that often serve as host species include the tessellated darter, mottled sculpin, and slimly sculpin (CWFNJ 2012).

No Project-specific surveys for the dwarf wedgemussel have been conducted or are planned by PennEast; however, the dwarf wedgemussel is known to occur in the Delaware River (PFBC 2014), and this species could occur at or near the proposed crossing of this river. The proposed crossing of the Delaware River would be accomplished via a HDD; as a result, no direct impacts on the Delaware River or the resources related to this river's mainstem are anticipated. Although HDD crossing methods are the wildlife agencies' (e.g., PFBC and FWS) preferred method to be used for crossing large waterbodies in order to avoid impacts on aquatic resources, and potential accidents associated with these crossing methods are highly unlikely to occur (see section 2 of this EIS), potential accidents are still possible. For example, while the HDD method is a proven technology, there are certain impacts that could occur as a result of the drilling such as the inadvertent release of drilling mud, which is a non-hazardous fluid comprised primarily of water, inert solids, and bentonite (i.e., a naturally occurring clay mineral). Drilling fluids that are released typically contain a lower concentration of bentonite when they surface because the bentonite is filtered out as it passes through sandy soils, and these compounds are not expected to have direct chemical impacts on aquatic species (but could have indirect impacts via increased short-term sedimentation; see below for more details). In addition, PennEast would develop a HDD crossing plan that would contain a description of how an inadvertent release of drilling mud would be contained and cleaned up, as well as a contingency plan for crossing the waterbody or wetland in the event the HDD is unsuccessful and how the abandoned drill hole would be sealed, if necessary. As a result, in the highly unlikely event that the HDD fails, measures would be taken to minimize impacts on adjacent areas and resources.

In addition to the proposed crossing of the Delaware River, the Project would also cross a number of upstream tributaries to the Delaware River. These upstream tributaries include the Wickecheoke Creek in Delaware Township and Stony Brook in Hopewell Township, in New Jersey. These proposed crossings have not been field-evaluated by PennEast due to lack of access. Therefore, **we recommend that**:

- **<u>Prior to construction</u>, PennEast should consult with the FWS and NJDEP in order to determine the need for targeted mussel surveys at the currently inaccessible crossings of the tributaries to the Delaware River that have the potential to support the dwarf**

wedgemussel. PennEast should file with the Secretary documentation of this consultation with the FWS and NJDEP, as well as any recommendations made by the FWS and NJDEP.

Individual mussels could be crushed by construction equipment and killed during the proposed conventional open-cut crossing method that may be used at the upstream tributaries to the Delaware River. In addition, construction of the Project could impact this species if activities increase the sedimentation levels found in occupied waterbodies. Increased sedimentation could impact this mussel through burial of eggs or mortality of their food supplies. These effects would impact species living both at the point where sedimentation increased and at points farther downstream. Research has shown variable sediment impacts of open-cut pipeline water crossings; for example, a review of 27 crossing monitoring studies reported turbidity ranging from less than 1mg/L up to 11,00 mg/L with measurable sediment deposition distances ranging from 164 feet to 656 feet downstream from a pipeline-waterbody crossings (Reid and Anderson 1999). To limit the potential impact of the Project on aquatic resources, PennEast would implement the measures found in FERC's Plan and Procedures, which contain BMPs to avoid or minimize sedimentation from entering waterbodies. PennEast would also implement dry open-cut crossing methods (see section 2.0 for more details) to reduce sedimentation impacts associated with in-water work.

Due to the potential for the Project to impact the dwarf wedgemussel at the proposed crossing of upstream tributaries to the Delaware River as well as a result in potential increased sedimentation to waterbodies, the Project *may affect and is likely to adversely affect* this listed species.

Consultation with the FWS is ongoing regarding ESA listed species, and as part of this ongoing consultation process the FWS may develop additional measures beyond those described in this EIS to avoid or minimize impacts on ESA listed species. See section 4.6.1.6 for our conclusion and recommendation regarding ongoing consultation.

4.6.1.4 Northeastern Bulrush

The northeastern bulrush is a wetland dependent plant species. The species was listed as endangered under the ESA May 7, 1991 (56 FR 21091). The northeastern bulrush is tall, with narrow leaves and a drooping flower head with chocolate-brown florets. Like other sedges, northeastern bulrush grows in small wetlands, sinkhole ponds, or wet depressions with seasonally fluctuating water levels. It may be found at the water's edge, in deep water, or in just a few inches of water. During dry spells the plant may be found growing in areas where there is no water visible (FWS 2006, FWS 1993).

PennEast conducted surveys for the northeastern bulrush within all accessible wetlands in the Pennsylvania portion of the Project area (i.e., within the range of this species) that were delineated as of 2015 (wetland delineation surveys are approximately 79 percent complete in Pennsylvania). Eight additional wetlands delineated near MP 26.9 will be surveyed by PennEast in 2016. No northeastern bulrush were identified during these surveys; however, not all portions of the Project area have been surveyed to date; therefore, there may be undocumented occurrence of this species within the unsurveyed areas. If this species is discovered during future surveys, PennEast would establish a 300-foot buffer around wetlands and 150-foot buffer around any waterways that support this species, and would avoid impacts within this buffer. If the

Commission decides to authorize the Project, the Certificate would grant PennEast the right to pursue access through eminent domain, at which time PennEast would complete the necessary remaining field surveys to determine if any wetlands or waterbodies contain the northeastern bulrush. If based on final surveys the pipeline would cross wetlands or waterbodies that contain this species, and the proposed no-disturbance buffers around these wetlands cannot be achieved, **we recommend that**:

- **<u>Prior to construction,</u> PennEast should file with the Secretary the results of additional surveys to determine potential presence of northeasernt bulrush. If the northeastern bulrush is identified within the proposed construction work area, PennEast should identify the specific measures that it would use to avoid impacts within 300 feet of wetlands or 150 feet of waterways where the species is found. PennEast should also provide documentation of the consultation with the FWS. If PennEast is unable to adhere to its proposed 300-foot no disturbance buffer around wetlands and 150-foot no disturbance buffer around any waterways that support the northeastern bulrush, then the affected wetland should be crossed via a HDD method.**

Not all potential habitat for this species has been surveyed to date, and the unsurveyed wetlands along the Project's disturbance footprint may support this species. As a result, the Project has the potential to impact this listed species. If this species cannot be avoided by the Project, then potential impacts could include direct removal of individual northeastern bulrush plants during trenching or clearing, crushing of plants by equipment, or alternations to their wetland habitats (e.g., altered wetland hydrology and increased risk of invasive plant establishment/spread). As discussed above for the bog turtle, PennEast would implement measures outlined in FERC's Plan and Procedures to minimize impacts on wetland habitats, including those that could potentially support northeastern bulrush. In addition, if PennEast is able to implement the recommended 300-foot no disturbance buffer around wetlands and 150-foot no disturbance buffer around any waterways that support this species, as proposed, then no direct or indirect impacts would occur and the Project "*may affect, but is not likely to adversely affect*" this species. However, if this species is located within a wetland that cannot be avoided by these distances, then construction and operation of the Project *may affect and is likely to adversely affect* this species.

Consultation with the FWS is ongoing regarding ESA listed species, and as part of this ongoing consultation process the FWS may develop additional measures beyond those described in this EIS to avoid or minimize impacts on ESA listed species. See section 4.6.1.6 for our conclusion and recommendation regarding ongoing consultation.

4.6.1.5 Atlantic Sturgeon and Shortnose Sturgeon

There are 4 distinct population segments (DPS) of the Atlantic sturgeon that are listed as endangered by the NMFS: the New York Bright DPS, the Chesapeake Bay DPS, the Carolina DPS, and the South Atlantic DPS; while the Gulf of Maine DPS is listed as threatened by NMFS (77 FR 5880). The shortnose sturgeon is listed as endangered by the NMFS throughout its range (32 FR 4001). Both species are listed as endangered by the states of Pennsylvania and New Jersey. Neither of these species was included on the list provided by the NMFS of federally listed species potentially occurring in the Project Area (NMFS 2014); however, PFBC requested that the crossing of the Delaware River be accomplished using HDD methods in order to avoid potential impacts on these two listed fish species. Although there is no data to indicate that these species occur in the Project area, they are included in this analysis in order to address concerns raised by the PFBC.

The Atlantic sturgeon is a long-lived (averaging 60 years) anadromous fish that is dependent on estuarine environments (NMFS 2016). They are a large bottom-feeding fish that can grow up to 14 feet long. The fish spends most of its adult and sub-adult life in the marine environment, while spawning in fresh water. However, juvenile Atlantic sturgeon appears to utilize the riverine habitat longer than other systems (Lazzari, O'Herron, and Hastings 1986). Spawning in the mid-Atlantic systems occurs April through May (NMFS 2016). Larval and juvenile sturgeon work their way downstream, spending months to years in the river and estuary before entering the open ocean as subadults (NMFS 2016). The New York Bright DPS habitats the Delaware River and is known to occur upstream to the fall line at Trenton, New Jersey. Distribution and spawning estimates within the Delaware River and tributaries show "accessible waterways" upstream to near Trenton, with spawning occurring downstream (NOAA 2014). This DPS was listed as "endangered" by the NMFS April 6, 2012 (77 FR 5880). The current condition of the population is considered poor compared to historic levels, with the spawning population in the Delaware River estimated to be less than 300 adults per year (NMFS 2012).

Shortnosed sturgeon are anadromous fish residing within nearshore coastal and riverine waters along the Atlantic Coast of North America. The shortnosed sturgeon is the smallest of the sturgeon species, reaching an average length of four feet. They are relatively long-lived, with age of first spawning ranging from 2 to 18 years, depending on region (NMFS 1998). They are benthic omnivores, and forage in the sand and mud substrate for crustaceans, insect larvae, worms, and mollusks; with adults consuming small fish as well (NMFS 1998, NMFS 2016). Within the Delaware River, primary food appears to be the Asiatic river clam (NMFS 2016). There are known landlocked populations, such as in the Holyoke Pool on the Connecticut River (NOAA 2008). Within the Delaware River system the population is estimated to range from 6,408 to 14,080 adults. Spawning migrations in the Delaware River occur in late march (NMFS 1998). Spawning generally occurs between March to early May (NMFS 2016). Adults spend most of their time in the upper and lower tidal river and estuary, with occasional entry into the nearshore (NMFS 2016). Overwintering of adults occurs generally in the upper tidal areas while the entire lower river has been documented as juvenile overwintering areas (NMFS 2016).

The Project would cross the Delaware River just downstream of Riegelsville, Pennsylvania, which is upstream of known occurrence of these two species. Recent information indicates that spawning sturgeon adults (i.e., ripe adults) are common in the spring as far upstream as Scudders Falls (which is located 30 river-miles downstream of the Project's proposed crossing of the Delaware River), with ripe adults captures occasionally occurring as far upstream as Lambertville (which is located approximately 20 river-miles downstream from the Project's proposed crossing of the Delaware River; NMFS 2010). PennEast would cross the Delaware River using a HDD method, which would avoid direct impacts on this waterway and its associated resources. As discussed above for the dwarf wedgemussel (see section 4.6.1.4), while the HDD method is a proven technology, an inadvertent release of drilling mud could still occur; however, the relatively small quantity of sediment or drilling mud that could be released is not expected to have an effect on species or habitats located 20 river-miles downstream. Furthermore, PennEast would develop a HDD crossing plan that would contain a description of how an inadvertent release of drilling mud would be contained and cleaned up, as well as a contingency plan for crossing a waterbody or wetland in the event that the HDD is unsuccessful and how the abandoned drill hole would be sealed, if necessary. In addition, both the Atlantic sturgeon and the shortnosed sturgeon are commonly found in estuary and tidal river habitats where turbidity can be naturally high due to environmental conditions such as the estuarine turbidity maxima (DRBC 2012); thereby indicating that these species are tolerant of high sedimentation levels. Because these species occur at least 20 river-miles downstream of the Project, because any inadvertent sediment discharge is expected to dissipate over the 20 river-miles between the Project and any potential listed fish, and because the background turbidity levels in the area can be naturally high and these species are tolerant to high sediment levels, the Project would have *no effect* on these ESA listed fish species.

4.6.1.6 Conclusions for Federally Listed Species

Table 4.6-1 lists the preliminary threat determinations made for ESA listed species. Complete surveys of all potential suitable habitat within the Project area have not been completed to-date due to lack of access granted by affected landowners. Therefore, **we recommend that:**

- **<u>Prior to construction</u>, PennEast should complete all necessary surveys for federally listed species and should file with the Secretary all survey results, including any comments received from the FWS on the surveys and their conclusions. The survey reports should include:**
    - **name(s) and qualifications of the person(s) conducting the survey;**
    - **method(s) used to conduct the survey;**
    - **date(s) of the survey;**
    - **area surveyed (include the mileposts surveyed); and**
    - **proposed mitigation that would substantially avoid or minimize the potential impacts.**

Consultation is ongoing regarding ESA listed species, and as part of this ongoing consultation process, the FWS may develop additional measures beyond those described in this EIS to avoid or minimize impacts on ESA listed species. These additional measures would be disclosed in the federal BO. The NMFS has indicated that no further consultation by the federal action agency (i.e., FERC) is necessary as part of the federal permit process with NMFS (NMFS 2014). Because consultation regarding ESA listed species is on-going with the FWS, **we recommend that:**

- **PennEast should not construct or use any of its facilities, including related ancillary areas for staging, storage, temporary work areas, and new or to-be-improved access roads, <u>until</u>:**
    - **the Commission staff completes formal ESA consultations with the FWS; and**
    - **PennEast has received written notification from the Director of the OEP that construction and/or implementation of conservation measures may begin.**

4.6.2 State-listed Species and State Species of Concern

In addition to the federally listed species discussed above, many of which are also listed as threatened or endangered by Pennsylvania and New Jersey, other state-listed species and state Species of Concern may potentially occur along the Project (see appendix G-13). PennEast has stated that it would adhere to the recommendations and requirements of the respective state wildlife management agencies (e.g., PGC, PADCNR, NJDEP-DFW) in order to avoid or minimize impacts on these species. Table 4.6-2 lists the state listed species that could potentially occur along the Project, while the state Species of Concern are listed in appendix G-13.

Note that although the bald eagle is listed as endangered in New Jersey, and has been relisted from "threatened" to "protected" in Pennsylvania, is addressed in section 4.5 of this EIS due to its status under the BGEPA.

TABLE 4.6-2

State Listed Species Potentially Occurring in the Vicinity of the PennEast Project (excluding those that are also federally listed)

Species	State Status a/	Counties/ State/ Location in the Project Area	Preferred Habitat	Survey Status of May 2016
Mammals				
Northern Flying Squirrel *(Glaucomys sabrinus macrotis)*	E (PA)	Carbon County, PA	Mature forested habitat	No surveys conducted or planned.
Bobcat *(Lynx rufus)*	E (NJ)	Hunterdon County, NJ	Deciduous-coniferous woodlands and forest edges, swamps, forested river bottomlands, brushlands, and other areas with thick undergrowth	No surveys conducted or planned.
Allegheny woodrat *(Neotoma magister)*	T (PA) E (NJ)	Carbon and Northampton, PA	Caves, rocky cliffs, ridge crests, overhangs and boulder fields with deep crevices and underground chambers.	Surveys have been completed between MP 51.0 to 53.0, and MP 53.2 to 53.5. No access was granted between MP 53 to 53.2 (this survey is pending, and will be conducted once access is granted)
Eastern Small-Footed Bat *(Myotis leibii)*	T (PA) E (NJ)	Carbon and Northampton, PA	Deciduous and coniferous forest.	Surveys have been completed between MP 8.5 to 10.5, 51 to 53, and 53.2 to 53.5. No access was granted between MP 10.5 to 11.5, and 53 to 53.2 (these surveys are pending and will be conducted once access is granted)
Reptiles and Amphibians				
Timber Rattlesnake *(Crotalus horridus)*	C (PA) E(NJ)	Luzerne, Carbon, and Northampton, PA	Deciduous forest habitat with at least 70 percent canopy cover, rocky hillsides and outcrops for use as hibernacula and exposed rocks for basking.	Phase 1 surveys have been completed between MP 10.5 to 10.7, 11.1 to 11.6, 12.9 to 13.1, 14.1 to 16.9, 22.5 to 23.1, 23.7 to 24.1, 29.3 to 29.5, 30.1 to 30.7, 32.9 to 33.3, 37.9 to 40.6, and 51.1 to 51.6. Phase 2 surveys are ongoing.
Eastern Redbelly Turtle *(Pseudemys rubriventris)*	T (PA)	Delaware River	Large bodies of water, including ponds, lakes, and rivers.	No surveys conducted or planned.
Wood Turtle *(Glyptemys insculpta)*	T (NJ)	Mercer County, NJ	Freshwater streams, brooks, creeks or rivers adjacent to undisturbed uplands.	Surveyed as part of the ongoing habitat assessment.
Northern Cricket Frog *(Acris crepitans)*	E (PA)	Carbon, PA	Shallow ponds with slow moving water.	Surveys have been completed.

TABLE 4.6-2

State Listed Species Potentially Occurring in the Vicinity of the PennEast Project (excluding those that are also federally listed)

Species	State Status a/	Counties/ State/ Location in the Project Area	Preferred Habitat	Survey Status of May 2016
Long-Tailed Salamander *(Eurycea longicauda longicauda)*	T (NJ)	All counties in NJ	Clear calcareous (limestone) spring-fed seepages, spring kettleholes, swampy floodplains, artesian wells, and ponds associated with springs.	Surveyed as part of the ongoing habitat assessment.
Southern Gray Tree Frog *(Hyla chrysoscelis)*	E (NJ)	All counties in NJ	Ponds found in forests.	No surveys conducted or planned.
Birds				
American Kestrel *(Falco sparverius)*	T (NJ)	All counties in NJ	Meadows, grasslands, early old field successional communities, open parkland, agricultural fields, and both urban and suburban areas.	Point count surveys are in progress (approximately 12.5 percent of required survey areas have been surveyed).
Barred Owl *(Strix varia)*	T (NJ)	All counties in NJ	Old-growth hardwood forests, cedar swamps, and upland oak-pine forests.	Call-back surveys are in progress (approximately 10.7 percent of required survey areas have been surveyed).
Bobolink *(Dolichonyx oryzivorus)*	T (NJ)	All counties in NJ	Low-intensity agricultural habitats, such as hayfields and pastures.	Point count surveys are in progress (approximately 12.5 percent of required survey areas have been surveyed).
Grasshopper Sparrow *(Ammodramus savannarum)*	T (NJ)	All counties in NJ	Grassy meadows, cultivated fields (especially alfalfa), lightly grazed pastures, roadsides, coastal grasslands, sedge bogs and edges of salt marshes.	Point count surveys are in progress (approximately 12.5 percent of required survey areas have been surveyed).
Osprey *(Pandion haliaetus)*	T (PA and NJ)	Bucks PA and Hunterdon NJ	Areas close to large bodies of water.	No surveys conducted or planned.
Red-Shouldered Hawk *(Buteo lineatus)*	E (NJ)	All counties in NJ	Mature wet hardwood swamps and riparian forests.	Call-back surveys are in progress (approximately 10.7 percent of required survey areas have been surveyed).
Savannah Sparrow *(Passerculus sandwichensis)*	T (NJ)	All counties in NJ	Grassy meadows, cultivated fields (especially alfalfa), lightly grazed pastures, roadsides, coastal grasslands, sedge bogs, edge of salt marshes, and tundra.	Point count surveys are in progress (approximately 12.5 percent of required survey areas have been surveyed).
Red-Headed Woodpecker *(Melanerpes erythrocephalus)*	T (NJ)	All counties in NJ	Deciduous woodlands, especially with beech or oak, lowland and upland habitats, river bottoms, open woods, groves of dead and dying trees, orchards, parks, open agricultural country, savanna-like grasslands with scattered trees, forest edges and along roadsides.	Habitat assessment in progress.
American Bittern *(Botaurus lentiginosus)*	E (NJ)	All counties in NJ	Freshwater marshes.	No surveys conducted or planned.

Note:
a/: E = endangered, T = threatened, C = Candidate

4.6.2.1 Northern Flying Squirrel

The northern flying squirrel is a state endangered species in Pennsylvania. While this species was once found across northern Pennsylvania, it is now limited to conifer forest habitats mostly in the Pocono region (Butchkowski and Turner 2010). Largely a nocturnal species, this small squirrel makes use of mature forested habitat. A portion of the Project would cross through areas the PGC has identified as areas where known northern flying squirrel populations exist (specifically MPs 27 to 32).

Impacts associated with the Project on this species include the clearing of forested areas that provide both denning sites and foraging habitat, vehicular traffic and construction noise impacts that may affect denning and exclusion of this species in the right-of-way. As a result, PennEast has committed to conducting all tree clearing activities between MPs 27 and 32 between April 15 and June 15, when the young are confined to dens in standing trees, as resulted by the PGC. Noise and vehicular traffic from heavy equipment are expected to be temporary impacts and limited to the construction window in the forested habitat corridor through Hickory Run State Park (i.e., where this species is expected to occur along the Project's route). Permanent impacts would include the conversion of upland forested habitat to herbaceous open field habitat within the permanent pipeline right-of-way.

In addition to the timing restrictions described above, PGC requires a northern flying squirrel mitigation plan related to the loss of this species habitat as a result of the Project. This plan may include, but is not limited to, the replanting of temporary right-of-way areas with various conifer species, monitoring of five years to ensure 80 percent survival and the installation of glide poles to facilitate passage across the cleared right-of-way. PennEast has not yet developed this plan, but has committed to working with the state agencies to develop this plan. As a result, we have recommend that PennEast continue to consult with the PGC as needed to finalize plans necessary to avoid or minimize impact the northern flying squirrel (see section 4.6.2.25).

4.6.2.2 Bobcat

The bobcat is a state endangered species in New Jersey and inhabits a variety of habitats including deciduous-coniferous woodlands and forest edges, swamps, forested river bottomlands, brushlands, and other areas with thick undergrowth (NJDEP-DFW 2002a). The species favor large tracts of habitat. Bobcats prefer to den in rock crevices, under fallen logs, in thick tangles of vegetation or under the root mass of a fallen tree (NJDEP-DFW 2002a), and will often change shelters daily. Once widespread and common in New Jersey, deforestation, development, and changes in agricultural practices since the turn of the century have led to the species decline.

Bobcats were identified by the NJDEP-NHP as potentially occurring within the Project area in Hunterdon and Mercer counties. It is unlikely that suitable habitat for this species is present in the Project area due to the fragmented nature of the lands this Project crosses; however, this species could be present in the Project area while transitioning between suitable habitats. This species has a large home range and any occurrence in the Project area would likely be avoided during the construction phase of the Project. Any impacts are expected to be related to noise and construction activity related disturbances and would be limited to the construction phase of the Project.

4.6.2.3 Allegheny Woodrat

The Allegheny woodrat is a state threatened species in Pennsylvania and a state endangered species in New Jersey, though it was only noted by the PGC as a potential species of concern for the Pennsylvania portions of the Project. The Allegheny woodrat inhabits caves, rocky cliffs, ridge crests, overhangs, and boulder fields with deep crevices and underground chambers. The woodrat hoards leafy twigs, seeds, nuts, and mushrooms in and around its expansive nest, which is constructed of leaves, twigs, and moss under cover within the rocky habitat (PGC 2008).

PGC identified one area of concern for this species in a predominantly mature forested ridge/valley-side habitat within the Ridge and Valley Physiographic Province of the Project footprint in Pennsylvania. PennEast had a qualified biologist conduct a site-specific habitat assessment and use survey for this species in May 2015. The area was found to contain suitable habitat for the species, but did not reveal any evidence of occupation by the Allegheny woodrat within the past five years. PennEast's has revised its proposed route in this area and the pipeline would no longer cross through or impact this area of suitable woodrat habitat. PennEast also conducted surveys in August 2015 between MPs 51 and 53.5, as requested by the PGC; however, no signs of this species were observed in this area either. Based on these survey results, the Project is not anticipated to impact the Allegheny woodrat.

4.6.2.4 Eastern Small-Footed Bat

The eastern small-footed bat is a state endangered species in New Jersey, a threatened species in Pennsylvania and is also a priority species in Pennsylvania's wildlife action plan. While this species was proposed for federal listing due to losses from White Nose Syndrome, it was determined that the listing was not warranted (Butchkowski 2014). This bat inhabits deciduous and coniferous forest, with the majority of reported sightings occurring in forested uplands within the Ridge and Valley Physiographic Province (Butchkowski 2014). In May 2015, PennEast had a qualified biologist conduct surveys for potential summer roost habitat in areas requested by the PGC; however, the Project was re-routed away from these areas prior to the completion of these surveys and the current proposed route would not cross through the areas identified by the PGC. With the updated proposed route as of July 2015, PGC required additional surveys between MPs 8.5 and 11.5 and MPs 51 and 53.5, with suitable roosting habitats identified within these portions of the Project area. Approximately 2.6 acres of suitable habitat were identified between MP 8.5 and 10.5 (access was not granted between MP 10.5 to 11.5), and 1.2 acres of suitable habitat between MP 51 and 53. In addition, 11 eastern small-footed bat were captured along the Project during PennEast's surveys (see survey description provided in section 4.6.1.1), indicating that this species does occur in the Project area.

PennEast has stated that it would adhere to the recommendations and requirements of the respective state wildlife management agencies as needed to avoid or minimize impacts on state-listed species, but PennEast has not identified specific measures that it would implement to avoid or minimize impacts on the eastern small-footed bat. Therefore, we have recommended that PennEast continue to consult with the PGC as needed to finalize plans necessary to avoid or minimize impact the eastern small-footed bat (see section 4.6.2.25).

4.6.2.5 Timber Rattlesnake

The timber rattlesnake is listed as a candidate species by Pennsylvania and as an endangered species by New Jersey. It is a venomous snake species that occurs in deciduous forest habitat with at least 70 percent canopy cover, rocky hillsides and outcrops for use as hibernacula, and exposed rocks for basking (PFBC 2011b).

PennEast conducted presence/absence and/or habitat surveys for this species in the summer of 2015. These surveys were conducted by a qualified herpetologist in potential habitat areas designated by the PFBC. Suitable habitat for this species was identified within the Project area and one timber rattlesnake was observed within the Project area in Pennsylvania during wetland field surveys in 2015. For areas that were identified as potential habitat, PennEast has committed to following the PFBC recommendations to minimize impacts on this species: which include spring presence surveys, avoiding the habitat during construction, and the restoration of gestation habitat following PFBC guidelines (PFBC 2010). PennEast has also committed to avoiding denning habitat identified near MP 39.2 and adhering to a 300 foot no disturbance buffer around these dens, as well as the use of rattlesnake monitor on-site during construction in suitable habitats between April 15 and October 15. We recommend that PennEast continue to consult with the PFBC as needed to finalize plans necessary to avoid or minimize impacts on the timber rattlesnake (see section 4.6.2.25).

4.6.2.6 Eastern Redbelly Turtle

The eastern redbelly turtle is a state threatened species in Pennsylvania. It is a large, aquatic, basking turtle that prefers larger bodies of water, including ponds, lakes, and rivers, with a soft-bottom substrate in which they can hibernate (Virgina Department of Game and Inland Fisheries 2016, Criswell 2012). This species uses nesting sites that are within approximately 1,000 feet of large waterbodies and are open and sunny with low vegetation (Criswell 2012).

The PFBC identified the eastern redbelly turtle as a species of concern along the portion of the Project that would cross the Delaware River. PennEast has committed to using a HDD crossing of the Delaware River, as requested by the PFBC, in order to avoid impacts on this species.

4.6.2.7 Wood Turtle

The wood turtle is a state threatened species in New Jersey, and inhabits both aquatic and terrestrial environments (NJDEP-DFW 2002b). They utilize aquatic habitats for mating, feeding, and hibernation, and terrestrial habitats for egg laying and foraging. The wood turtle prefers relatively remote freshwater streams, brooks, creeks, or rivers adjacent to undisturbed uplands. Nesting wood turtles require loose substrate on fully exposed (unshaded) sites, such as sandy banks or sand-gravel bars in streams (NatureServe 2014). When natural openings are unavailable they may use man-made disturbances such as road grades, railroad grades, sand pits, or plowed fields.

The wood turtle were identified by the NJDEP-NHP as potentially occurring within the Project area in Hunterdon and Mercer counties. Two areas were identified as being potential habitats within the Project area following PennEast's surveys, at MPs 99.1 and 105.5. In order to minimize impacts on the wood turtle, NJDEP recommends completing in-stream work only between November 15 and March 15, as well as conducting pre-construction clearance surveys where during spring breeding season (i.e., in April to May), and PennEast has committed to following these measures. PennEast would attempt to meet this timing restriction, but if this timing restriction was infeasible PennEast would conduct pre-construction clearance surveys where for wood turtles during spring breeding season (i.e., in April to May). If any wood turtle are found in the work area, the individuals would be temporarily relocated to areas outside of potential disturbance areas. Furthermore, we recommend that PennEast continue to consult with the NJDEP as needed to finalize plans necessary to avoid or minimize impacts on the wood turtle (see section 4.6.2.25).

4.6.2.8 Northern Copperhead

The northern copperhead *(Agkistrodon contortrix mokasen)* is a venomous snake listed as a species of special concern in New Jersey and inhabits rocky hillsides, thickets, farmlands, and forested and scrub-shrub wetlands within the northern portion of the state. Based on these habitat requirements, there is potential for this species to occur within the Project area.

PennEast would be required by the NJEP-ENSP to conduct surveys on county-owned lands in order to identify potential gestating and hibernating habitats, and to conduct pre-construction clearance surveys in suitable habitat. PennEast has committed to following state-recommended measures for state-listed species. Therefore, we recommend that PennEast continue to consult with the NJDEP as needed to finalize plans necessary to avoid or minimize impacts on the northern copperhead (see section 4.6.2.25).

4.6.2.9 Eastern Box Turtle

The eastern box turtle *(Terrapene carolina carolina)* is listed as a species of special concern in New Jersey and inhabits a variety of habitats. These habitats include open fields, meadows, forests, and wetlands. This species is predominantly terrestrial and individuals have a small home-range. Hibernation occurs in loose soil between October and April. Though field surveys were not conducted specifically for the eastern box turtle, a turtle was observed on the proposed pipeline route during other field surveys.

Because this species has been identified in the Project area and the Project's construction and operation could impact this species, we recommend that PennEast continue to consult with the NJDEP as needed to finalize plans necessary to avoid or minimize impacts on the eastern box turtle (see section 4.6.2.25). PennEast has indicated that the state has requested that biological monitors be used during construction in areas that could support this species, and that they would work with the state agencies regarding the details related to these monitors (e.g., location monitored, qualifications of the monitors, etc).

4.6.2.10 Northern Cricket Frog

The northern cricket frog is a state endangered species in Pennsylvania, and is a member of the treefrog family (*Hylidae*). They inhabit areas with shallow ponds with slow moving water that are typically sunny and contain floating algal mats and abundant shoreline vegetation. Breeding takes place between June and July.

Habitat assessment surveys for this species were conducted by PennEast (via a qualified herpetologists) upon request by the PFBC, within the Hickory Run watershed (i.e., between MPs 28.1 and 29.6). Suitable habitat was identified between MPs 28.6 and 30.1, and subsequent presence/absence surveys were conducted by PennEast in the summer of 2015. No northern cricket frogs were found during these surveys. However, because suitable habitat for this species has been identified in the Project area and the Project's construction and operation could impact this species habitat, we recommend that PennEast continue to work with the applicable wildlife agencies to develop appropriate mitigation measures to avoid or minimize the Project's impact on this species (see section 4.6.2.25).

4.6.2.11 Long-Tailed Salamander

The long-tailed salamander is a state threatened species in New Jersey. It inhabits clear calcareous (limestone) spring-fed seepages, spring kettleholes, swampy floodplains, artesian wells, and ponds associated with springs (NJDEP-DFW 2002c). They may also inhabit abandoned mines or caves permeated by calcareous groundwater. These aquatic habitats are typically located in forests that include mature, closed canopy maple/mixed deciduous, mixed hardwood, or hemlock/mixed deciduous woodlands (NJDEP-DFW 2002c).

Long-tailed salamanders were identified by the NJDEP-NHP as potentially occurring within the Project area in Northampton and Mercer counties, New Jersey. Field surveys conducted by PennEast discovered one wetland with a spring seep that could support this species. The NJDEP has recommended that wetland areas that could support this species be crossed via and HDD methods in order to avoid impacts on this species and its habitat. Because suitable habitats for this species likely occurs in the Project area and the Project's construction and operation could impact this species, we recommend that PennEast continue to work with the applicable wildlife agencies to determine where HDD methods are appropriate for avoiding impacts on this species as well as to any develop an additional appropriate mitigation measures that may be necessary (see section 4.6.2.25).

4.6.2.12 Southern Gray Tree Frog

The southern gray tree frog is a state endangered species in New Jersey. It inhabits both upland and wetland forests, that contain ponded areas used for breeding (NJDEP-DFW 2002d).

While the southern gray tree frog was not identified in consultations with NJDEP-NHP or NJDEP-DFW as a species of concern for this Project, it was identified as a potential concern in stakeholder comments. According to Conserve Wildlife Foundation of New Jersey, this species is limited to Cape May, Cumberland, Atlantic, and Ocean counties, with the most populations occurring in southern Cape May County (which are located the other end of the state from where the Project is located). As a result, the Project would not cross areas inhabited by this species. Therefore, no impacts on this species are expected.

4.6.2.13 Cobblestone Tiger Beetle

The cobblestone tiger beetle (*Cicindela marginipennis*) has no state listing status; however, it is a state species of special concern in New Jersey. This species inhabits cobblestone deposits found in rivers and streams within eastern United States and Canada. Larvae of this species burrow into the sand found between and behind cobbles (Kinsley 2014).

The occurrence of this species within the Project area is uncertain. Because the Project could potentially impact this species (e.g., by disturbing cobblestone areas along river edges during waterbody crossings), we recommend that PennEast continue to work with the applicable wildlife agencies to determine if specific measures would be appropriate to avoid or minimize the Project's impact on this species (see section 4.6.2.25). PennEast has however, indicated that they proposed to cross potential cobblestone tiger beetle using a HDD method in order to avoid impacts on this species.

4.6.2.14 American Kestrel

The American kestrel is a state threatened species in New Jersey. It inhabits open to semi-open lands. These lands include meadows, grasslands, early old field successional communities, open parkland, agricultural fields, and both urban and suburban areas (Poole 2015). Breeding territories are characterized by short ground vegetation, with either no or sparsely distributed woody vegetation. These habitat preferences often attract this species to human altered or managed areas such as farmland, parkland, and livestock pastures (NJDEP-DFW 2002e). Winter and non-breeding habitats usually include more forested areas. Breeding activities and nesting occur in tree cavities facing open areas. This species is a secondary cavity nester, using woodpecker-excavated or natural cavities in large trees, crevices in rocks, and nooks in buildings and other structures in which to construct nests. They do not hollow out their own nests. Kestrels prefer nesting cavities facing open areas with no obstructions. The availability of suitable cavities appears to limit its populations in many parts of the breeding range (NJDEP-DFW 2002e).

This species was identified as potentially occurring within the Project area by the New Jersey NHP. PennEast would limit tree clearing to times outside of the March 1- July 31 breeding and nesting period for raptors. This timing restriction could minimize the Project related impacts on this species. In addition, PennEast would work with the NJDEP-DFW regarding the states "nest box program", which aims to enhance nesting opportunities for kestrel. PennEast would also be required to follow all restrictions found in the MBTA related to impacts on migratory birds, and would be required to develop a Migratory Bird Conservation Plan developed in consultation with FWS (see Section 4.5).

4.6.2.15 Barred Owl

The barred owl is a state threatened species in New Jersey. It inhabits dense old-growth hardwood (coniferous or hardwood), cedar swamps, and upland oak-pine forests (Poole 2015). They are thought to prefer older forests due to greater availability of potential nest sites, lower stem densities facilitating easier hunting, and closed canopy for thermoregulation and protection from mobbing by crows. Barred owls are cavity nesters and are dependent on large old growth snags and excavated cavities for nesting. Nesting cavities that may have been formed by disease, broken branches, or cavities in the tops of broken trees are preferred habitat (NJDEP-DFW 2002f, Poole 2015).

This species was identified by the NJDEP-NHP as potentially occurring within the Project area in Hunterdon and Mercer counties. One area surveyed by PennEast and determined to be potential suitable habitat is located at MP 96.3. PennEast would limit tree clearing to times outside of the March 1- July 31 breeding and nesting period for raptors. This timing restriction could minimize the Project related impacts on this species. PennEast would also be required to follow all restrictions found in the MBTA related to impacts on migratory birds, and would be required to develop a Migratory Bird Conservation Plan developed in consultation with FWS (see Section 4.5).

4.6.2.16 Bobolink

The bobolink (*Dolichonyx oryzivorus*) is a state threatened species in New Jersey. It is a grassland bird inhabiting low-intensity agricultural habitats, such as hayfields and pastures, during the breeding season (NJDEP-DFW 2002g). They may also occupy lush fallow fields and meadows of grasses, forbs, and wildflowers. Ground nesting occurs in areas of greatest vegetation height and density. Nests are often placed in areas of greatest vegetative height and density. Although small numbers of bobolinks may nest in grasslands of 5-10 acres, larger sized fields support higher densities of nesting pairs. Bobolink nests tend to be sited in wet habitats, transitional between drier soils and areas providing poor drainage (Poole 2015). Nests are always located on the ground, often at base of large forbs such as meadow rue (*Thalictrum dasycarpum*), golden alexander (*Zizia aurea*), and clover (*Trifolium* sp.).

Bobolink was identified by the NJDEP-NHP as potentially occurring within the Project area in Hunterdon and Mercer counties. One area surveyed by PennEast and determined to be potential suitable habitat was located at MP 92.2; however, no birds were identified during the survey. General protective measures for grassland birds include not mowing a right-of-way between March 15 and September 10. While no nests were identified during the summer survey, PennEast would utilize biological monitors in potentially suitable habitats during construction and would conduct pre-construction clearance surveys prior to the grubbing and clearing phase. Implementation of the mowing and grubbing timing restriction would assist in minimizing impacts on this species. Operation of the pipeline, including maintenance mowing of the right-of-way, would maintain grassland habitat, but would also be a potential impact on ground nesting grassland birds. Timing restrictions for mowing operations during Project operation would aid in minimizing impacts on ground-nesting grassland birds. PennEast would also be required to follow all restrictions found in the MBTA related to impacts on migratory birds, and would be required to develop a Migratory Bird Conservation Plan developed in consultation with FWS (see Section 4.5).

4.6.2.17 Grasshopper Sparrow

The grasshopper sparrow *(Ammodramus savannarum)* is a state threatened species in New Jersey. It inhabits grassy meadows, cultivated fields (especially alfalfa), lightly grazed pastures, roadsides, coastal grasslands, sedge bogs, and edges of salt marshes (Poole 2015). The species nest in hay and alfalfa fields, fallow fields, grasslands, upland meadows, airports, pastures, and vegetated landfills (NJDEP-DFW 2002h). This species tends to avoid areas with extensive tree cover and are rarely found in open woodlands.

The grasshopper sparrow was identified by the NJDEP-NHP as potentially occurring within the Project area in Hunterdon and Mercer counties. No suitable habitat was identified within accessible properties that were surveyed by PennEast in 2015; however, suitable breeding habitat for this species may be present. PennEast has committed to implementing the general protective measures for grassland birds, as described above for the bobolink, to minimize impacts. PennEast would also be required to follow all restrictions found in the MBTA related to impacts on migratory birds, and would be required to develop a Migratory Bird Conservation Plan developed in consultation with FWS (see Section 4.5).

4.6.2.18 Osprey

The osprey *(Pandion haliaetus*) is state-threatened in both Pennsylvania and New Jersey, and was identified by both states as being a species of concern for the Project area. Ospreys are primarily fish-eating birds-of-prey that inhabit areas close to large bodies of water. They are often observed hovering over water when fishing, carrying fish and when engaging in aerial courtship displays (Poole et al 2002). Ospreys nest in close proximity to water in live trees and dead snags, but in recent years have been shown to have a preference for human-made structures such as artificial nesting platforms, and cell phone and electric transmission towers (Brauning 1992, PGC 2009). Migrating ospreys arrive in the Northeast from overwintering locations in the south every year typically from the last week of March through early May (McWilliams and Brauning 2000).

The PGC identified 24 locations between MPs 77.1 and 77.6 in Bucks County, Pennsylvania and Hunterdon County, New Jersey, as osprey restricted areas. As a result, PennEast has committed to conduct work in this area between August 1 and March 24 to comply with the NJDEP-DFW recommended work window for this species, in order to minimize impacts on ospreys. PennEast would also be required to follow all restrictions found in the MBTA related to impacts on migratory birds, and would be required to develop a Migratory Bird Conservation Plan developed in consultation with FWS (see section 4.5).

4.6.2.19 Red-Shouldered Hawk

The red-shouldered hawk is a state endangered species in New Jersey. It inhabits mature wet woods, such as hardwood swamps and riparian forests (NJDEP-DFW 2002i). Nests are predominately located in areas where there are abundant wetlands, small forest openings, and limited areas of large open water such as lakes. Although red-shouldered hawks require extensive tracts of forested habitat for nesting, territories may also contain edges that this species will use as foraging habitats (NJDEP-DFW 2002i).

The red-shouldered hawk was identified by the NJDEP-NHP as potentially occurring within the Project area in Hunterdon and Mercer counties. No suitable habitat was identified within accessible properties that were surveyed by PennEast in 2015; however, suitable breeding habitat for this species may be present. PennEast has committed to conducting tree clearing to times outside of the March 1- July 31 breeding and nesting period for raptors. This timing restriction would minimize the impacts that the Project would have to this species. PennEast would also be required to follow all restrictions found in the MBTA related to impacts on migratory birds, and would be required to develop a Migratory Bird Conservation Plan developed in consultation with FWS (see Section 4.5).

4.6.2.20 Savannah Sparrow

The savanna sparrow is a state threatened species in New Jersey. It inhabits grassy meadows, cultivated fields (especially alfalfa), lightly grazed pastures, roadsides, coastal grasslands, sedge bogs, edge of salt marshes, and tundra (Poole 2015). During the spring and fall migration, savannah sparrows tend to occupy open fields, roadsides, dune vegetation, coastal marshes, edges of sewage ponds and other ponds in open country (NJDEP-DFW 2002j). This species avoids areas with extensive tree cover, and is rarely found in open woodlands. Suitable habitats provide a mix of short and tall grasses, a thick litter layer, dense ground vegetation, and scattered shrubs, saplings, or forbs.

The savanna sparrow was identified by the NJDEP-NHP as potentially occurring within the Project area in Hunterdon and Mercer counties. No suitable habitat was identified within accessible properties that were surveyed by PennEast in 2015; however, it is assumed that suitable breeding habitat for this species may be present. PennEast has committed to implementing the general protective measures for grassland birds, as described above for the bobolink. PennEast would also be required to follow all restrictions found in the MBTA related to impacts on migratory birds, and would be required to develop a Migratory Bird Conservation Plan developed in consultation with FWS (see Section 4.5).

4.6.2.21 Red-Headed Woodpecker

The red-headed woodpecker is a state threatened species in New Jersey. It inhabits deciduous woodlands, especially with beech or oak, lowland and upland habitats, river bottoms, open woods, groves of dead and dying trees, orchards, parks, open agricultural country, savanna-like grasslands with scattered trees, forest edges and along roadsides (Poole 2015). A sparse understory is favored for foraging and dead or dying trees are required for nesting. During the start of the breeding season, the red-headed woodpecker moves from the forest interior to the forest edge. Typical nest sites are located in dead trees or in dead portions of live trees (Poole 2015). Typical nesting sites can include well-weathered dead pines, pine stubs that have long since lost their bark, maple, birch (*Betula*), cottonwood (*Populus*), oak, and in utility poles, often in open areas with little ground vegetation or in stands of trees with no understory.

The red-headed woodpecker was identified by the NJDEP-NHP as potentially occurring within the Project area in Hunterdon and Mercer counties, and it was identified during PennEast's surveys at milepost 104.7. PennEast has committed to conducting tree clearing to times outside of the March 1- July 31 breeding and nesting period. This timing restriction would minimize the impacts that the Project would have on this species. PennEast would also be required to follow all restrictions found in the MBTA related to impacts on migratory birds, and would be required to develop a Migratory Bird Conservation Plan developed in consultation with FWS (see Section 4.5).

4.6.2.22 American Bittern

The American bittern is a state endangered species in Pennsylvania and New Jersey. This species breeds in freshwater marshes, generally containing tall vegetation, migrating to warmer coastal climates during colder months, where both managed wetlands and dry grasslands can be important overwintering habitats (Cornell Lab of Ornithology 2015, Haffner and Gross 2014). They are generally solitary foragers in shorelines and vegetation fringes at dawn and dusk. Their diet consists of insects, crustaceans, fish, amphibians, reptiles, and small mammals (Cornell Lab of Ornithology 2015). Nests are built as a mound or platform, three to eight inches above the water surface, and generally within tall vegetation in shallow water (Tarlowe 2002).

The New Jersey Endangered and Nongame Species Program requested that surveys for "secretive marsh birds", such as the American bittern, be conducted in wetland habitats. These surveys were conducted by PennEast within assessable parcels (i.e., areas where survey access was granted) during their wetland habitat assessment surveys in 2015 and 2016. No American bitterns or suitable habitats were identified during these surveys; however, the entire Project area has not yet been surveyed due to lack of access. Therefore, we recommend that PennEast continue to consult with the PFBC as needed to finalize plans necessary to avoid or minimize impacts on the American bittern (see section 4.6.2.25).

PennEast has indicated that if suitable habitats are identified within the Project area during the on-going surveys, then PennEast would comply with construction timing restrictions in these areas that may be recommended by the state agencies to minimize impacts on this species, as well as work with the state agencies to determine if presence/absence surveys would be required. If a presence/absence survey is required, PennEast would utilize the North American Marsh Bird Survey Protocols, or other protocols required by the state. In addition, PennEast would follow all restrictions found in the MBTA related to impacts on migratory birds, and would be required to develop a Migratory Bird Conservation Plan developed in consultation with FWS (see section 4.5).

4.6.2.23 Avian Species of State Special Concern in New Jersey

A number of avian species that are listed as "Avian Species of Special Concern" in New Jersey, but which are not listed under the ESA or state laws, could occur within the Project Area (see appendix G-13). This includes the brown thrasher, cliff swallow, Cooper's hawk, eastern meadowlark, great blue heron, least bittern, northern harrier, northern parula, veery, wood thrush, worm eating warble, and yellow-breasted chat.

Potential suitable habitat for these species occurs in the Project area in the form of forested, grassland, and wetland habitats. PennEast would implement the timing restrictions described above for forested and grassland avian species. These timing restriction would minimize the impacts that the Project would have on these species. In addition, PennEast would follow all restrictions found in the MBTA related to impacts on migratory birds, and would be required to develop a Migratory Bird Conservation Plan developed in consultation with FWS (see section 4.5).

4.6.2.24 State Listed Plant Species

Several plant species that may potentially be impacted by the Project are listed by Pennsylvania and New Jersey as threatened, endangered, or special concern. These plant species are identified in appendix G-13. Of these, several were identified specifically by the PADCNR Bureau of Forestry and State Parks as needing to be surveyed for in Carbon County, Pennsylvania. PennEast conducted surveys for these species using qualified botanists during the spring and summer of 2015.

Though state-required mitigation measures have not been determined for state listed plant species, procedures that have been implemented by similar projects for rare plants include flagging/fencing the plant or population to facilitate avoidance during construction, minor alignment shifts to avoid larger populations, topsoil segregation, use of straw (not hay) for post-construction stabilization, using seed mixes containing only native, non-grass vegetation for re-seeding, and relocation of individual plants and/or collection of seeds for cold storage/stockpiling and replanting at a later date. These measures also typically include monitoring at two- and five-year intervals to ensure that they are successful. We have recommended that PennEast continue to coordinate with state regulatory agencies with jurisdiction over state-listed plants and determine if, where, and what specific measures would be implemented to minimize impact on state-listed plants (see section 4.6.2.25), as well as to complete their ongoing survey for rare species in the survey corridor (see section 4.6.1.6).

4.6.2.25 Conclusions for State Listed Species and State Species of Concern

PennEast has stated that it would adhere to the recommendations and requirements of the respective state agencies with jurisdiction over state listed species and state species of concern (e.g., PGC, PFBC, PADCNR, and NJDEP-DFW) in order to avoid or minimize impacts on these species, including completing all necessary surveys for state species. PennEast has indicated that ongoing permit review by Pennsylvania and New Jersey may result in the identification of additional avoidance, minimization, or mitigation measures that would be attached as permit conditions. In general, we believe that relying on state-level experts for the development of measures that would minimize impacts on state listed species and state species of concern would appropriately avoid or reduce impact on these species. However, all mitigation measures would need to be consistent with, and not contradictory to, any measures required by our review and attached to the Commission's authorization to the Project if so authorized. Therefore, **we recommend that:**

- **<u>Prior to construction</u>, PennEast should file with the Secretary a comprehensive list of measures developed in consultation with applicable state wildlife agencies to avoid or mitigate impacts on state-listed species and state species of concern, which should include but not be limited to measures applicable to the eastern small-footed bat, timber rattlesnake, eastern box turtle, northern cricket frog, long-tailed salamander, and Cobblestone tiger beetle.**

4.7 LAND USE, RECREATION, AND VISUAL RESOURCES

4.7.1 Land Use

This section describes the land requirements for construction and operation of the Project, the current use of the lands, and an evaluation of the Project-related impacts.

Construction of the Project would impact a total of about 1,613.5 acres. About 66 percent of this acreage would be utilized for the pipeline facilities, including the construction right-of-way and ATWS. The remaining acreage affected during construction would be associated with aboveground facilities (4 percent), pipe and contractor ware yards (23 percent), and access roads (7 percent). Construction in Pennsylvania would affect a total of 1,182 acres; of this about 534 acres would be retained as permanent right-of-way for operation of the pipeline and the aboveground facilities. In New Jersey, about 431 acres would be affected by construction, and approximately 250 acres would be retained for permanent operation of facilities. About 44.5 miles (27.0 miles in Pennsylvania and 17.5 miles in New Jersey), or about 39 percent, of the 115.0-mile-long pipeline route would be constructed adjacent to existing rights-of-way (see section 2.2.1).

PennEast proposes to use a 100-foot-wide construction right-of-way and would retain a 50-foot-wide permanent right-of-way. See appendix C for typical construction right-of-way cross section diagrams for the Project. The proposed facilities are more fully described in section 2.0.

4.7.1.1 Environmental Setting

Six general land use types would be affected by the Project, which include open land, agricultural, forest/woodland, industrial/commercial, residential, and open water. Table 4.7.1-1 summarizes the acreage of each land use type that would be affected by construction and operation of the Project. The definitions of each land use type are as follows:

- Open land – includes other utility rights-of-way, open fields, vacant land, herbaceous and scrub-shrub uplands, non-forested lands, emergent wetland, scrub-shrub wetland, golf courses, and municipal land;
- Agricultural – includes active hayfields and cultivated lands;
- Forest/woodland – includes mixed oak forest and forested wetlands;
- Industrial/commercial – includes manufacturing or industrial plants, paved areas, landfills, mines, quarries, electric power or natural gas utility facilities, developed areas, roads, railroads and railroad yards, and commercial or retail facilities;
- Residential – includes existing developed residential areas and planned residential developments. This may include large developments, low, medium, and high density residential neighborhoods; urban/suburban residential; multi-family residences; residentially zoned areas that have been developed; or short segments of the route at road crossings with homes near the route alignment; and
- Open water – includes all waterbody crossings, unless the waterbody is not visible on aerial photography (in which case it is incorporated into the surrounding land use).

The primary land use types affected during construction would be forest/woodland (38 percent), agricultural land (37 percent), industrial/commercial land (13 percent), and open land

(7 percent). Open water and residential land would make up the remaining 5 percent affected during construction of the proposed Project.

4.7.1.2 Pipeline Facilities

The proposed pipeline and laterals would consist of about 118.8 miles of new multi-diameter pipe. The predominant land uses that would be affected by construction of the pipeline are forest/woodland (39 percent) and agricultural land (36 percent). Land use-related impacts associated Project pipeline facilities would include the disturbance of existing uses within the right-of-way during construction and the retention of an expanded or new permanent right-of-way during operation of the pipeline.

In addition to the construction right-of-way, various ATWS would be used for construction. PennEast identified several areas where it believes site-specific conditions require the use of ATWS to facilitate construction at waterbody crossings, agricultural land crossings, road crossings, railroad crossings, and areas where special construction techniques would be utilized. Appendix G-15 lists the locations of these ATWS and their dimensions. Appendix G-15 also lists the acreage of impact and the justifications for the use of additional workspace. A total of 427.7 acres would be temporarily impacted for ATWS, including 189.2 acres of forest and woodland, 169.9 acres of agricultural land, 25.7 acres of open land, 17.5 acres of residential land, and 14.5 acres of commercial and industrial land. Additionally, 10.9 acres of open water would be affected by the ATWS required for the construction of the Project. These impacts would be associated with a dry crossing of the Susquehanna River, and would be constructed by diverting the flow of the river during low flow conditions. These areas would be allowed to revert to prior land uses through natural successional processes or would be restored in accordance with applicable regulatory requirements and landowner agreements.

4.7.1.3 Aboveground Facilities

Construction at the proposed launcher/receiver sites, interconnects, lateral tap sites, Kidder Compressor Station site, and 11 MLV locations would disturb about 66 acres. Of this, 60.5 acres would be permanently retained for operation of the aboveground facilities. Table 4.7.1-1 summarizes the land requirements and existing land use for the aboveground facilities associated with the Project. The primary land uses that would be affected by construction of the aboveground facilities are forest/woodland (75 percent), open land (14 percent), and agricultural land (9 percent), with residential land and industrial/commercial land making up the remaining 2 percent. During operation, PennEast would primarily impact forest/woodland (78 percent), open land (11 percent), and agricultural land (9 percent) for the aboveground facilities, with residential land and industrial/commercial land making up the remaining 2 percent.

TABLE 4.7.1-1

Land Use Types and Acreage Impacted by Construction and Operation of the PennEast Project a/

State Facility County	Agriculture		Forest / Woodland		Open Land		Residential		Industrial/ Commercial		Open Water		Total	
	Const. b/	Oper. b/	Const. b/	Oper. b/	Const. b/	Oper. b/	Const. b/	Oper. b/	Const. b/	Oper. b/	Const. b/	Oper. b/	Const. b/	Oper. b/
Pennsylvania - Mainline														
Luzerne County	12.6	5.8	156.0	109.9	12.1	6.2	8.1	4.1	11.7	9.2	12.4	1.5	213.0	136.7
Carbon County	24.7	12.3	162.1	123.8	23.2	22.7	2.6	1.7	11.9	8.6	0.3	1.0	224.8	170.0
Northampton County	131.4	74.2	77.3	49.1	14.9	10.0	13.1	6.3	11.9	9.5	0.0	0.5	248.6	149.6
Bucks County	16.0	8.2	3.2	1.6	0.4	0.2	0.2	0.2	1.0	0.2	0.0	0.3	20.9	10.6
Hellertown Lateral														
Northampton County	5.0	3.6	9.5	6.4	2.2	1.9	0.7	0.4	0.1	0.2	0.0	0.0	17.6	12.5
Compressor Station														
Carbon County	0.0	0.0	34.6	34.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.7	34.0
Aboveground Facilities c/														
Luzerne County	0.0	0.0	9.8	7.6	4.0	3.6	0.0	0.0	0.2	0.1	0.0	0.0	13.9	11.2
Carbon County	0.1	0.1	1.0	1.0	1.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1
Northampton County	0.0	0.0	1.2	0.9	1.8	1.5	0.0	0.0	0.3	0.1	0.0	0.0	3.3	2.5
Bucks County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pipe and Contractor Ware Yards														
Luzerne County	7.8	0.0	1.1	0.0	10.2	0.0	0.0	0.0	19.5	0.0	0.0	0.0	38.6	0.0
Carbon County	4.6	0.0	0.8	0.0	24.8	0.0	0.5	0.0	20.1	0.0	0.0	0.0	50.8	0.0
Northampton County	130.5	0.0	4.9	0.0	0.0	0.0	0.0	0.0	83.3	0.0	0.0	0.0	218.7	0.0
Bucks County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Access Roads														
Luzerne County	0.7	0.1	16.8	0.7	1.4	0.0	10	1.8	16.4	1.2	0.0	0.0	45.1	3.9
Carbon County	0.2	0.0	5.2	0.8	0.1	0.0	14.2	0.0	13.2	0.0	0.0	0.0	32.9	0.8
Northampton County	4.9	0.0	1.7	0.7	2.2	0.0	0.5	0.0	6.4	0.0	0.0	0.0	15.6	0.8
Bucks County	0.6	0.0	0.8	0.0	0.4	0.0	0.0	0.0	0.9	0.0	0.0	0.0	2.7	0.0
Subtotal - Pennsylvania	**339.1**	**104.3**	**486.0**	**336.5**	**98.8**	**46.2**	**49.9**	**14.5**	**196.9**	**29.1**	**12.7**	**3.3**	**1182.3**	**533.7**
New Jersey - Mainline														
Hunterdon County	124.8	72.3	86.2	76.9	14.3	8.0	6.8	4.3	3.7	5.5	0.1	0.7	236.0	167.7

TABLE 4.7.1-1

Land Use Types and Acreage Impacted by Construction and Operation of the PennEast Project a/

State Facility County	Agriculture		Forest / Woodland		Open Land		Residential		Industrial/ Commercial		Open Water		Total	
	Const. b/	Oper. b/	Const. b/	Oper. b/	Const. b/	Oper. b/	Const. b/	Oper. b/	Const. b/	Oper. b/	Const. b/	Oper. b/	Const. b/	Oper. b/
Mercer County	37.5	23.4	42.9	28.3	4.6	3.3	2.6	1.5	1.2	2.2	0.2	0.4	89.1	59.0
Gilbert Lateral														
Hunterdon County	0.0	0.0	0.4	0.2	1.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.8
Lambertville Lateral														
Hunterdon County	5.0	3.1	8.4	5.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	13.8	8.3
Aboveground Facilities c/														
Hunterdon County	2.4	2.4	3.7	3.6	1.8	1.4	0.0	0.0	0.1	0.1	0.0	0.0	8.0	7.5
Mercer County	3.3	3.3	0.1	0.1	0.9	0.3	0.5	0.5	0.0	0.0	0.0	0.0	4.8	4.2
Pipe and Contractor Ware Yards														
Hunterdon County	35.1	0.0	2.3	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	37.4	0.0
Mercer County	26.6	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	26.8	0.0
Access Roads														
Hunterdon County	2.9	1.0	1.4	0.9	0.8	0.1	1.0	0.3	3.5	0.4	0.0	0.0	9.6	2.7
Mercer County	2.0	0.0	1.4	0.0	0.0	0.0	0.0	0.1	0.8	0.0	0.0	0.0	4.2	0.1
Subtotal – New Jersey	**239.6**	**105.5**	**146.8**	**115.0**	**23.2**	**14.0**	**11.1**	**6.7**	**9.3**	**8.2**	**0.3**	**1.1**	**430.8**	**250.3**
Project Total	**578.7**	**209.8**	**632.8**	**451.5**	**122.0**	**60.2**	**61.0**	**21.2**	**206.2**	**37.3**	**13.3**	**4.4**	**1613.5**	**784.0**

Notes
a/ All units in acres and rounded to the nearest 0.1. Values of 0.0 represent impacts less than 0.05 acre and are included in the total Project impacts. The totals shown in this table may not equal the sum of addends due to rounding.
Agricultural Land - Active cropland, pasture, orchards, vineyards, and/or hay fields;
Forest and Woodland - Tracts of upland or wetland forest or woodland that would be removed for the construction right-of-way or extra work or staging areas;
Open Land - Non-forested lands, herbaceous and scrub-shrub wetlands, and maintained utility right-of-way;
Residential Land - Residential yards, residential subdivisions, and planned new residential developments;
Industrial or Commercial Land - Electric power or gas utility stations, manufacturing or industrial plants, landfills, mines, quarries, commercial or retail facilities, and roads;
Open Water – Water Crossings greater than 100 feet.
b/ Construction acreage includes construction right-of-way and additional temporary work space. Operation acreage includes the permanent right-of-way.
c/ Aboveground facilities include MLVs, interconnects, and launcher/receiver sites.
Data Source: United States Department of Agriculture (USDA), National Agricultural Statistics Service (NASS) Cropland Data Layer (USDA-NASS, 2014) and 2013 Aerial Photographs. Adjustments were made by PennEast to the 2014 USDA-NASS Cropland Data Layer based on manual review of high-resolution 2013 aerial photography and information gathered during field surveys conducted in 2014 and 2015.

The Kidder Compressor Station would be a new facility constructed to serve the entire Project. PennEast has proposed the use of an about 60-acre site in Carbon County, Pennsylvania; however, the Kidder Compressor Station would be located on about 34 acres of this site. The property is zoned light industrial, and existing land use consists of forest/woodland. About ten years ago, Blue Ridge Development initiated preliminary planning regarding development of a strip mall near or at the proposed Kidder Compressor Station site; however, subsequent studies resulted in a determination that the tract would not accommodate this type of development. Blue Ridge Development confirmed in May 2015 that the depiction of the development available on their website would not take place as detailed in the conceptual text, and that any discussions regarding future development would be made subject to the proposed Kidder Compressor Station, as PennEast would be the initial tenant on the tract. Construction of the compressor station would result in the temporary disturbance of 34.7 acres, primarily forest/woodland land for the construction and operation of the compressor station. The acreage not used for the compressor station, related facilities, and access would be used as a buffer and/or mitigation lands. Operation of the compressor station would result in permanent disturbance of 34 acres.

4.7.1.4 Pipe and Contractor Ware Yards

Fourteen areas have been identified that are under consideration for use as pipe and contractor ware yards during construction of the proposed Project. Twelve of these proposed pipe and contractor ware yards would be located in Pennsylvania in Luzerne, Carbon and Northampton counties. Two proposed pipe and contractor ware yards would be located in Hunterdon and Mercer counties, New Jersey. Table 4.7.1-1 summarizes the land requirements and existing land use for the pipe and contractor ware yards. The primary land use that would be affected by these yards are agricultural (55 percent) and industrial/commercial (33 percent).

4.7.1.5 Access Roads

Approximately 116 temporary access roads are identified for use during construction of the Project for a total length of about 32 miles, of which 11 access roads (2.2 miles) would be used during operation. During construction, use of access roads would impact about 110 acres of land, 13 percent of which would occur in New Jersey. The primary land uses that would be affected by access roads during construction are industrial/commercial land (37 percent), forest land (25 percent), residential land (23 percent), and agricultural land (10 percent). Permanent access road impacts would occur on about 8 acres of land, 34 percent of which would occur in New Jersey. The primary land uses that would be affected by access roads during operation are forest/woodland (37 percent), residential (27 percent), industrial/commercial land (19 percent), and agricultural land (13 percent).

One permanent access road, located completely within the Kidder Compressor Station site, would be used for construction and operation of the Kidder Compressor Station. This permanent access road would be located within a 120-foot-wide utility and mutual access easement.

4.7.1.6 Operational Land Use

Following construction, about 784 acres of new land would be permanently maintained by operation of the Project. About 91 percent of this acreage would be for the new pipeline right-of-way including the laterals, 8 percent for the compressor station and other aboveground facilities, and 1 percent for new permanent access roads. The primary land use types that would be permanently maintained would be forest/woodland (58 percent), agricultural land (27 percent), and open land (8 percent).

Forest/woodland affected by the Project would consist mainly of mixed oak forest and consists of both wetland and upland areas. The total acreage for impacts on forest/woodland includes the clearing of the entire 50-foot-wide permanent right-of-way; however, only the 30-foot-wide maintained operation right-of-way in upland forests and 10-foot-wide maintained operational right-of-way in wetlands would require the permanent removal of trees in these forested areas. Forest land impacts were minimized by locating Project facilities and work areas adjacent to existing rights-of-way, where feasible, allowing some overlap during construction, and within areas that have been previously cleared of forest vegetation. Following construction, forest/woodland cleared outside of the permanent right-of-way would be allowed to regenerate to preconstruction conditions, but impacts on forest resources within these areas would last for several years. Forest/woodland within the new maintained permanent right-of-way would be permanently converted to a non-forested condition.

Open land would be temporarily affected during Project construction by removal of vegetation, disturbance of soils, and restricted access. Impacts would also be short term, and would be minimized by the implementation of PennEast's E&SCP, and by restoring open land areas to preconstruction conditions. Since the permanent pipeline right-of-way would be maintained as open land, no permanent change in land use where the right-of-way crosses existing open land areas is expected. Following construction, these areas would continue to function as open land. However, some activities, such as the building of new commercial or residential structures, would be prohibited on the new permanent right-of-way.

Industrial and commercial land uses could be temporarily affected during Project construction by increased dust from exposed soils, construction noise, traffic congestion, and restricted access. Industrial and commercial properties would be restored to preconstruction conditions or as specified in specific landowner agreements. All road surfaces would be reestablished as soon as practicable following construction so that normal access to area businesses can resume. Measures to reestablish road surfaces would include filling in the trench and leaving either a temporary dirt surface or a rough coat of pavement to restore access and use of steel plates and/or wood mats. So that construction equipment would not damage the road surface when traveling across it during construction, a separate contractor would return later to complete final paving, at which time the road surface is considered permanently restored to pre-existing conditions. Crossing of private driveways would be coordinated with business owners and landowners so as to maintain vehicle access and minimize impacts.

The proposed route would cross or be co-located with underground pipelines or electrical wires owned and operated by the following companies: Buckeye Partners, Columbia Gas Transmission, Elizabethtown Gas Co, Metropolitan Edison Company, Jersey Central Power & Light (JCP&L), PECO Energy, Pennsylvania Power and Light, Texas Eastern Transmission, Transcontinental Gas Pipe Line, UGI, and Williams Field Services. PennEast has negotiated placement of the pipeline within the existing JCP&L easement but is still working with the other utilities to finalize location of the pipeline within or adjacent to the existing rights-of-way, to further minimize impacts on existing land use.

PennEast would develop a Traffic Management Plan as part of its Environmental Construction Plan. This plan would be developed in conjunction with local transportation and public safety officials and would identify all roads that would be used to transport equipment and workers during the construction period, including identifying areas of restricted access; scheduling contractors to arrive during off-peak travel times so as to minimize impact on local traffic; and would describe how the Project delivery routes have been timed to minimize impacts on area businesses and residents. Signage would be used to clearly mark approved roads to access the Project. To ensure that construction activities are minimized in the Project area and on area businesses and residences, including to address any increased traffic conditions, **we recommend that:**

- **<u>Prior to construction,</u> PennEast should file with the Secretary its final Traffic Management Plan, developed in conjunction with local public transportation and safety officials along the Project pipeline route.**

PennEast would require about 104 acres of agricultural land in Pennsylvania and 100 acres in New Jersey as new permanent right-of-way, but operation of the proposed pipeline would not affect the continuing use of these areas for agricultural activities after construction is complete. Temporary impacts on agricultural land during Project construction could occur from removal of vegetation, disturbance of soils, and increased dust from exposed soils. Agricultural land in the Project area does not include any specialty crops, sugar maple stands, areas used for timber production, or commercial tree farms. If PennEast identifies any apiaries that would be crossed by the Project, PennEast would coordinate with the landowner and implement appropriate BMPs to minimize impacts on operation. For a discussion of prime farmland, see section 4.2.1.1. Following construction, all affected agricultural land would be restored to preconstruction conditions to the extent possible, in accordance with PennEast's E&SCP and Agricultural Impact Minimization Plan (Appendices D and E), and with any specific requirements identified by landowners or state or federal agencies with appropriate jurisdiction. The Agricultural Impact Minimization Plan was developed in consultation with various agricultural agencies including the New Jersey State Agriculture Development Committee, the Mercer County Agricultural Development Board, the Hunterdon County Agricultural Development Board, and representatives from a number of the impacted municipalities in New Jersey in response to landowner concerns regarding the use of pesticides and other agricultural restrictions. The New Jersey State Agriculture Development Committee provided PennEast with recommendations for pipeline installations in agricultural lands and PennEast incorporated these recommendations into the Agricultural Impact Minimization Plan to the extent practicable. The pipeline would be constructed with a minimum cover of 4 feet. If specific farming operations require more than 4 feet of cover, PennEast would negotiate the minimum cover with that specific landowner. Following construction, pipeline operation would not prohibit the use of the proposed Project right-of-way for agricultural purposes, or the use of heavy farm equipment within the permanent right-of-way.

No certified organic farms would be crossed by or located adjacent to the Project. If PennEast identifies any certified organic farms that would be crossed by the Project, PennEast would coordinate with the landowner and implement appropriate BMPs to minimize impacts on operation and certification of organic farms. BMPs may include, but are not limited to, the use of tire wash stations, weed-free fill, and use of only water for dust suppression, in addition to measures identified in PennEast's Agricultural Impact Minimization Plan (Appendix E).

Effects of construction on agricultural land would be minor and short term. PennEast would maintain landowner access to fields, storage areas, structures, and other agricultural facilities during construction and would maintain irrigation and drainage systems that cross the right-of-way to the extent practicable. PennEast would not use herbicides or pesticides for clearing or maintaining the temporary or permanent right-of-way, or within 100 feet of a waterbody. We received a comment concerning potential impacts on honeybees due to the use of pesticides. Temporary loss of herbaceous cover during construction would reduce habitat normally utilized by pollinators, such as bees and butterflies. As discussed in section 4.5.2.3, PennEast would use native seed mixes, and herbaceous habitat is expected to return to pre-construction conditions. Revegetation is expected to create habitat for native and domestic pollinators where pollinator habitat may not exist, and may enhance foraging habitat for local apiaries and native pollinators. Routine vegetation maintenance of the permanent operational right-of-way would be limited to mechanical clearing or mowing. PennEast states in its E&SCP (Appendix D) that it would not use herbicides or pesticides anywhere along the maintained permanent right-of-way. Therefore routine vegetation maintenance would not impact honeybees or apiaries.

PennEast would work with landowners to identify any drain tiles or irrigation systems present within the construction work areas and develop avoidance and mitigation measures should any be encountered during construction. Should drain tiles become damaged during construction, they would be permanently repaired within 14 days of construction completion, and before the pipeline trench is backfilled, weather and soil conditions permitting. All drain tiles would be repaired with materials of the same or better quality. The drain tile markers would not be removed until the tile repairs have been inspected, approved, and accepted by PennEast's inspectors, the county inspectors where applicable, and the landowner or tenant.

Landowners would be compensated for crop losses and other damages caused by construction activities. PennEast's landowner-compensation program would address temporary loss of productivity in affected areas after construction. PennEast would discus with landowners during easement negotiations any compensation for loss of use, loss of resources, and any damages that may occur to property during construction.

4.7.2 Federal and State Lands and Easement Requirements

Pipeline operators must obtain easements from existing landowners to construct and operate proposed facilities, or acquire the land on which the facilities would be located. Easements can be temporary, granting the operator the use of the land during Project construction (e.g., ATWS, temporary access roads, contractor ware yards), or permanent, granting the operator the right to operate and maintain the facilities once constructed.

In addition to the right to use specific property for construction, operation, maintenance, pipeline repair and replacement, and related activities as referenced above, an easement agreement between a company and a landowner typically specifies compensation for losses resulting from construction. This includes losses of non-renewable and other resources, damages to property during construction, and restrictions on existing uses that would not be permitted on the permanent right-of-way after construction. Compensation would be based on a market study conducted by a licensed real estate appraiser. Additionally, landowners have the opportunity to request that site-specific factors and/or development plans for their property be considered during easement negotiations, and that specific measures be taken into account. Other than the easement, construction of the pipeline would not place any restrictions on a landowner's ability to sell or transfer ownership of a property during or after construction.

If an easement cannot be negotiated with a landowner and the Project is approved by the Commission, PennEast may use the right of eminent domain to acquire the property necessary to construct the Project under Section 7(h) of the Natural Gas Act. This right would extend to all Project-related workspace covered by the Commission's approval, including the temporary and permanent rights-of-way, aboveground facility sites, pipe and contractor ware yards, access roads, and ATWS. PennEast would still be required to compensate the landowner for the right-of-way and damages incurred during construction. However, the level of compensation would be determined by a court according to state or federal law.

4.7.3 Existing Residences, Commercial and Industrial Facilities, and Planned Developments

Appendix G-16 lists residences and other structures located within 50 feet of the construction work areas associated with the Project (i.e., construction right-of-way, ATWS, and pipe and contractor ware yards) by milepost, and indicates the type of structure and its distance from the proposed Project work areas. Based on field surveys conducted by PennEast where access was available, and review of aerial photography in other locations, PennEast's proposed construction work areas would be located within 50 feet of 462 structures (i.e., houses and apartment buildings, commercial or industrial facilities, sheds, garages), with 298 structures within 25 feet of PennEast's proposed construction work area. A total of 66 of these structures within 25 feet of PennEast's proposed construction work area are residential structures.

4.7.3.1 Existing Residences and Commercial and Industrial Facilities

In residential areas, the two most significant impacts associated with construction and operation of a pipeline are temporary disturbances during construction and the encumbrance of a permanent right-of-way, which would restrict the construction of new permanent structures within the right-of-way. Temporary impacts during construction of the pipeline facilities in residential areas could include: inconvenience caused by noise and dust generated by construction traffic; disruption to access of homes by trenching of roads or driveways; increased localized traffic from transporting workers, equipment, and materials to the work site; disturbance of lawns, landscaping, and visual character caused by the removal of turf, shrubs, trees, and/or other landscaping between residences and adjacent rights-of-way; and potential damage to existing septic systems or wells.

Special construction and restoration methods would be used at site-specific locations to minimize residential neighborhood disruptions and to reduce impacts during construction. Construction through or near residential areas would be done in a manner that minimizes adverse effects on residences, including prompt and thorough cleanup. Landowner access to homes would be maintained except for the brief periods essential for laying the new pipeline. Landowners whose property access would be affected by pipeline construction across roadways would receive preconstruction notification, and measures would be implemented to ensure that construction activities do not prevent access to residential areas by fire and emergency vehicles. During any period when a road is completely cut or temporarily closed, steel plates would be available on site to immediately cover the open area to permit travel of emergency vehicles.

Additional measures proposed by PennEast to minimize construction-related impacts on residential areas include notification 24 hours prior to activities unless otherwise specified in specific landowner easement agreements, development of a Traffic Management Plan, separation of construction into smaller, residential-specific spreads, and scheduling contractors to arrive during off-peak travel times so as to minimize impact on local traffic.

PennEast would implement the following measures to minimize construction-related impacts on residences within 50 feet of the construction work areas as listed in appendix G-16:

- reduce the construction right-of-way width in order to maintain a minimum of 25 feet between the residence and the construction work area for a distance of 100 feet on either side of the residence;
- install safety fencing along the edge of the construction work area adjacent to residences for a distance of 100 feet on either side of the residence;
- preserve as many trees as possible on residential properties;
- trim tree branches on the working side of the construction right-of-way only as needed to allow for safe operation and passage of construction equipment. Vegetation removed would be disposed of as negotiated with the landowner;
- restore or replace lawns and landscaping to pre-construction conditions;
- repair as necessary walls and other structures within the construction work area as negotiated with the landowner;
- segregate and restore topsoil where appropriate or as negotiated with the landowner;
- maintain utility service during construction activities;
- to the extent possible, maintain access for landowners and farm animals to residences, driveways, fields, and other agricultural facilities during construction;
- construct only during daylight hours, except where special conditions dictate;
- clean up and backfill the area immediately after pipeline installation; and
- revegetate disturbed areas at the first seasonal opportunity.

For the residences within 50 feet of the construction workspace, PennEast would finalize its Residential Construction Plans in accordance with affected landowners of proposed measures to minimize disruption and to maintain access to the residences. The plans include a dimensioned drawing depicting the residence relative to the pipeline construction; workspace boundaries; the proposed right-of-way; and nearby residences, structures, roads, and miscellaneous features (e.g., other utilities, playgrounds, etc.). Notes that describe the general measures that would be implemented at residential properties (e.g., 24-hour-advance landowner notification prior to construction, installation of safety fencing), potential construction techniques to be used, workspace restrictions, anticipated construction schedule, and safety considerations are also included. Available site-specific Residential Construction Plans have been included in appendix I. We have reviewed the available Residential Construction Plans and find them acceptable overall. Because the entire pipeline routes have not yet been surveyed, there is the potential that other residences and structures that would be affected by the pipeline could be identified after FERC issues ta Certificate, and PennEast gain access to properties previously denied. In addition, as survey permissions and landowner negotiations continue, the Project would be continue to be engineered so that it minimizes impacts on existing residences and structures. However, to ensure that the Residential Construction Plans address landowner comments received by PennEast and allow property owners adequate opportunity for input regarding construction activity close to their residence, **we recommend that:**

- **Prior to construction, PennEast should file with the Secretary, for review and written approval by the Director of the OEP:**

  1) the results of previously unsurveyed areas along the pipeline route and an updated list of residences and commercial structures within 50 feet of the construction right-of-way;
  2) for all residences identified within 25 feet of a construction work area, a final site-specific construction plan that includes all of the following: a dimensioned site plan that clearly shows the location of the residence in relation to the pipeline, the boundaries of all construction work areas, the distance between the edge of construction work areas and the residence and other permanent structures, and equipment travel lanes;
  3) a description of how and when landowners would be notified of construction activities;
  4) documentation of landowner concurrence if a structure within the construction work area would be relocated or purchased; and
  5) documentation of landowner concurrence if the construction work areas would be within 10 feet of a residence.

Following construction, all residential areas would be restored to preconstruction conditions or as specified in written landowner agreements. Landowners would continue to have use of the right-of-way provided it does not interfere with the easement rights granted to PennEast for construction and operation of the pipeline facilities. For example, no structures would be allowed on the permanent right-of-way, including houses, decks, playgrounds, tool sheds, garages, poles, guy wires, catch basins, swimming pools, trailers, leach fields, septic tanks, or other structures not easily removed.

In order to provide appropriate resolution of landowner complaints during construction and operation of the proposed Project, **we recommend that:**

- **PennEast should develop and implement an environmental complaint resolution procedure. The procedure shall provide landowners with clear and simple directions for identifying and resolving their environmental mitigation problems/concerns during construction of the Project and restoration of the right-of-way. Prior to construction, PennEast should mail the complaint procedures to each landowner whose property would be crossed by the Project.**

  - **In its letter to affected landowners, PennEast should:**

    - **provide a local contact that the landowners should call first with their concerns; the letter should indicate how soon a landowner should expect a response;**

- **instruct the landowners that if they are not satisfied with the response, they should call PennEast's Hotline; the letter should indicate how soon to expect a response; and,**
- **instruct the landowners that if they are still not satisfied with the response from PennEast's Hotline, they should contact the Commission's Landowner Helpline at 877-337-2237 or at LandownerHelp@ferc.gov.**

- **In addition, PennEast should include in its weekly status report a copy of a table that contains the following information for each problem/concern:**
    - **the identity of the caller and date of the call;**
    - **the location by milepost and identification number from the authorized alignment sheet(s) of the affected property;**
    - **a description of the problem/concern; and,**
    - **an explanation of how and when the problem was resolved, would be resolved, or why it has not been resolved.**

We conclude that implementation of PennEast's construction methods for working in proximity to residences and other structures and site-specific Residential Construction Plans, in addition to implementation of the recommendations discussed above, would minimize disruption to residential and commercial areas to the extent practicable and facilitate restoration of these areas as soon as possible upon completion of construction.

4.7.3.2 Planned Developments

Local and county government planning officials were contacted to identify planned residential, commercial, and industrial developments within 0.25 mile of the proposed Project facilities. Publicly available website and public comments received by FERC were also reviewed during the planning and survey process. Planned developments identified within 0.25 mile of the Project are described in table 4.7.3-1.

Several of the planned developments, although located within 0.25 mile of the Project, would not be crossed by any Project facilities (see table 4.7.3-1). Planned construction dates are not currently available for any of these developments identified in the table. Since the Project would not directly cross any of these developments, Project activities would not cause any direct conflicts or preclude the development of these projects. If a planned development's construction period overlaps with construction of the proposed facilities, indirect impacts such as noise from construction activities, dust resulting from soil work, and traffic congestion would occur on a temporary basis. In the event of overlapping construction periods, PennEast would continue to coordinate with the developer and permitting authorities to identify any potential conflicts associated with construction of the Project. A discussion of cumulative impacts associated with the proposed Project and these planned developments is provided in section 4.12. Identified planned developments are discussed in more detail below. A number of route variations were evaluated to avoid ongoing developments and planned future developments (see section 3.3.2).

TABLE 4.7.3-1

Planned Residential and Commercial Developments Within 0.25 Mile of the PennEast Project

Planned Development Description	Facility/Municipality, County, State	Closest MP	Distance / Direction from Construction Work Area	Status
PennEast Mainline				
Susquehanna Estates Subdivision Project identified through FERC comment (Harry Salavantis)	Jenkins Township, Luzerne County, PA	7.6	Not available	Project on hold per conversation by PennEast with Township Manager, Bob Jones.
Subaru Car Dealership (Wyoming Valley Motors) Landowner in process of developing land	Plains Township, Luzerne County, PA	10.3-10.5	0.1 mile; north	Site preparation commenced in November 2015; final approval pending
Blue Ridge Real Estate Properties Resort residential and commercial properties in Pocono Mountains Blue Mountain Interconnect at MP 50.9	Kidder Township, Carbon County, PA	26.1-28.7	1.0 mile; east	Not Available
Little Gap Estates Subdivision Project identified through FERC comment (Thomas and Carol Kidd)	Lower Towamensing Township, Carbon County, PA	47.3	Not available	Not Available
Fields at Trio Farms Subdivision Residential subdivision with 374 lots on Gremar Road, per zoning officer (Laurie Sesse)	Lower Nazareth Township, Northampton County, PA	61.8-64.7	0.1 mile; southwest	Under partial construction with homes constructed more than 0.25 mile from the route
Park In Bethlehem Township Located between William Penn and Freemansburg Avenue Park identified through FERC comment (Barry Roth)	Bethlehem Township, Northampton County, PA	69.3	Within workspace	Not Available
St. Luke's Hospital Anderson Campus Expansion Expansion of hospital on 300-acre site across Route 33 from the existing hospital facility	Bethlehem Township, Northampton County, PA	70.0	Within workspace (HDD)	Under construction
Huntington Knolls, LLC Housing Development Project identified through FERC comment (Philip Glebel) Residential development with age-restricted housing units as well as assisted living units Twenty buildings west of Route 519 and south of the Fox Hill development	Holland Township, Hunterdon County, NJ	82.1	0.1 mile; north	Not Available

TABLE 4.7.3-1

Planned Residential and Commercial Developments Within 0.25 Mile of the PennEast Project

Planned Development Description	Facility/Municipality, County, State	Closest MP	Distance / Direction from Construction Work Area	Status
Hopewell Township Affordable Housing Plan Proposed affordable housing plans provided by Hopewell Township	Hopewell Township, Mercer County, NJ	112.9-113.3	Within workspace next to existing natural gas pipelines	Not Available
Hopewell Township Emergency Services Facility	Hopewell Township, Mercer County, NJ			Conceptual design plan submitted for public review by voter referendum
Proposed Wawa on HWY 31 Landowner and developer are looking to develop land and are currently working with Wawa to put a store on the property	Hopewell Township, Mercer County, NJ	113.4-113.5	Within workspace next to existing natural gas pipelines	Zoning permit denied in October 2014
Princeton Research Lands Properties Landowner has plans for residential subdivisions on all 3 properties	Hopewell Township, Mercer County, NJ	113.9-114.4	Within workspace next to existing natural gas pipelines	Not Available
Subdivision in Pennington and Hopewell Townships Project identified through FERC comment (Jonathan Feinberg) Seven-lot residential subdivision located at Block 72, Lot 9; RJA Investment Fund VIII, LP is contract purchasers of the property Commonly known as 135 Blackwell Road	Pennington and Hopewell Townships, Mercer County, NJ	114.0	0.1 mile; northeast	Not Available

Susquehanna Estates Subdivision

The Susquehanna Estates Subdivision project, located near MP 7.6, in Jenkins Township, Luzerne County, Pennsylvania was identified in comments submitted by landowner and developer Harry Salavantis. Although construction appeared to be ongoing during a July 2015 site visit, PennEast contacted the Jenkins Township Manager in June 2015 and reported that the subdivision is currently on hold and that no plans have been submitted to date for this project.

Subaru Car Dealership (Wyoming Valley Motors)

A landowner in Plains Township, Luzerne County, Pennsylvania is in the process of developing land to construct a new Subaru car dealership. The dealership would be located 0.1 mile north of the proposed route near MPs 10.3 to 10.5. Heavy equipment began preparing the site in November 2015 and it is expected that the Subaru and Kia dealerships on Pierce Street, Kingston, will relocate to this site.

Blue Ridge Real Estate

The proposed pipeline crosses the Blue Ridge Real Estate Properties project in Carbon County, Pennsylvania, which consists of multiple resort residential and commercial properties in Kidder Township near MPs 26.1 to 28.7. PennEast, in an agreement with Blue Ridge Real Estate, coordinated to allow access to natural gas in the pipeline through the proposed Blue Mountain Interconnect at MP 50.9.

Little Gaps Subdivision

The Little Gaps Subdivision project, located near the proposed pipeline at MP 47.3, in Lower Towamensing Township, Carbon County, Pennsylvania was identified as a potential development in comments submitted by Thomas and Carol Kidd.

Fields at Trio Farms Subdivision

The Fields at Trio Farms Subdivision (Kay Builders, Inc.) in Lower Nazareth Township, Northampton County, Pennsylvania consist of a proposed 374-lot residential subdivision, encompassing 89.8 acres located about 0.1 mile southwest of MPs 61.8 to 64.7. The subdivision is currently under construction and PennEast has been in discussions with Mr. Wayne Doyle, Manager of Land Development Division, Cowan Associates, Inc. at Kay Trio, LLC's request. PennEast is proposing to install the pipeline along or near the eastern property line to allow for a share of the easement between Kay Trio, LLC and the adjacent landowner. Negotiations between the landowners and PennEast are ongoing.

Park in Bethlehem Township

A township-owned parcel in Bethlehem Township, Northampton County, Pennsylvania was identified in comments by Barry Roth as the potential location for a future park. This parcel would be located within the construction workspace at MP 69.3 between William Penn Highway and Freemansburg Avenue. The proposed route is located adjacent to the on/off ramp for Pennsylvania Route 33 at this location. No further information is available on this park.

St. Luke's Hospital

St. Luke's University Health Network's Anderson Hospital, opened in 2011 and located near MP 70.0, submitted sewage plans in the fall of 2015 for planned expansion of the hospital across Route 33. PennEast modified its proposed route as requested by St. Luke's, to avoid impacts on these plans, and proposes to use a HDD. See route variations evaluated in this location in section 3.3.2.

Huntington Knolls, LLC Housing Development

The Huntington Knolls, LLC Housing Development in Holland Township, Hunterdon County, New Jersey consists of 29 buildings with age-restricted housing units, as well as assisted-living units. This project would be located 0.1 mile north of the Project near MP 82.1; however, the development is not currently under construction and has yet to receive necessary state and local permits for construction. PennEast continues to correspond with Hunting Knolls, LLC regarding right-of-way agreement language and the proposed alignment.

Hopewell Township Affordable Housing Plan

Hopewell Township provided plans for affordable housing on Walsh Cross Pen Road in Hopewell Township, Mercer County, New Jersey near MPs 112.9 to 113.3. The area encompasses land within proposed workspace, next to existing natural gas pipelines. No further information is available on this development.

Hopewell Township Emergency Services Facility

Hopewell Township states that a 3-acre emergency service site is planned on Route 546 (Tax Block 91, Tax Lot 3.02), which was transferred to Township ownership from Merrill Lynch in March 2003. Conceptual design plans were presented to the public by voter referendum. To date, no construction has been scheduled. PennEast has discussed the planned development of the facility with Hopewell Township. PennEast would install the pipeline within JCP&L's permanent easement which would minimize impact on the development of the property. The newly acquired pipeline easement would result in an additional 15 to 20 feet of additional impact outside of the existing JCP&L easement. Permanent building structures could not be constructed within PennEast's permanent easement; however, it would be possible for Hopewell Township to locate driveways or parking areas within the increased 15 to 20 feet of the easement.

Proposed Wawa Gas Station/Mini-mart on Highway 31

A Wawa Gas Station/Mini-mart was proposed on Highway 31 in Hopewell Township, Mercer County, New Jersey near MPs 113.4 to 113.5. The Wawa facility would be located within previous workspace used by utilities to maintain their existing natural gas pipelines. The Hopewell Township Zoning Board of Adjustment issued a resolution in October 2014 denying the Wawa application.

Princeton Research Lands Properties

A residential subdivision is planned for land in Hopewell Township, Mercer County, New Jersey, near MPs 113.9 to 114.4. This subdivision would be located within workspace previously used by utilities to maintain their existing natural gas pipelines.

Subdivision in Pennington and Hopewell Townships

A potential subdivision to be located near the Transco Interconnect and Transco Receiver Site, in Pennington and Hopewell Townships, Mercer County, New Jersey was identified in comments submitted by Jonathan Feinberg. The project would consist of a seven-lot residential subdivision, commonly known as 135 Blackwell Road.

Department of Transportation

Three Pennsylvania Department of Transportation (PennDOT) projects and one New Jersey Department of Transportation (NJDOT) project were identified that are either proposed and/or currently under construction within 10 miles of the Project. Projects were identified based on publically available data including PennDOT's *2013-2016 Transportation Improvement Plan* (PennDOT 2016) and New Jersey's Construction Updates database (NJDOT 2016). The majority of these projects include repairs or replacement of existing structures, such as bridges and roadways. The four transportation projects are described as follows:

- PennDOT's Interstate 81 project in Plains Township, Luzerne County, Pennsylvania consists of the replacement of four bridges, two over Jumper Road and two over Sunset Road. The project is located 0.1 to 1.7 miles to the southwest of MP 10.5 in the Upper Susquehanna watershed. This transportation project is currently under construction.
- PennDOT's US 209 Interchange Road project is located in Franklin and Towamensing Townships in Carbon County, Pennsylvania within two of the same watersheds as the proposed Project (Pohopoco Creek and Aquashicola Creek). Highway restoration will consist of mill and fill of 8.4 miles of roadway and repair of various drainages. US 209 intersects the proposed Project near MP 44.5. This project is currently in the preliminary engineering phase with an estimated project start date of June 2016.
- PennDOT's Freemansburg Avenue Interchange project is located in Bethlehem Township in Northampton County, Pennsylvania. The project will entail roadway reconstruction and bridge rehabilitation. This PennDot project would be 0.1 mile from the proposed Project near MP 70.1.
- NJDOT's Route 31 Expansion project is located through Raritan Township and Flemington Borough in Hunterdon County, New Jersey. The project involves construction of a new parkway system and expansion of street networking to Route 31 throughout Raritan Township and Flemington Borough. The transportation expansion project will be located 7.4 miles to the northwest of the proposed Project.

During pre-filing, PennEast incorporated minor route variations in an effort to avoid and mitigate future planned developments. However, landowner negotiations are ongoing regarding final easement location and impacts on planned development including the proposed Fields at Trio Farms subdivision and the Huntington Knolls, LLC housing development; therefore, to ensure that impacts on planned developments are minimized to the greatest extent possible, **we recommend that:**

- **<u>Prior to the end of the draft EIS comment period</u>, PennEast should file with the Secretary any route adjustments, workspace modifications, or mitigation measures developed through PennEast's ongoing consultations with landowners regarding the following planned and/or pending projects:**

- **Fields at Trio Farms Subdivision;**
- **Huntington Knolls, LLC Housing Development; and**
- **Hopewell Township Emergency Services Facility.**

PennEast should provide documentation of correspondence with these landowners. PennEast should either incorporate these deviations or a route that avoids the resources of concern, or otherwise explain how potential impacts on resources have been effectively avoided, minimized, or mitigated.

PennEast would implement the mitigation measures contained in its E&SCP, and any additional measures as arranged with specific landowners. We conclude that implementation of the identified mitigation measures would adequately minimize impacts of pipeline construction on planned residential and commercial developments to less than significant levels. Operational impacts would be limited to the encumbrance of a permanent right-of-way, which would prevent the construction of permanent structures within the right-of-way.

4.7.4 Coastal Zone Management

The Project would not be located within a Coastal Zone Management Area in Pennsylvania or New Jersey.

4.7.5 Other Special Interest Areas

USGS topographic maps; aerial photographs; correspondence with federal, state, and local agencies; field reconnaissance; and internet searches were used to identify parks, recreation areas, scenic areas, and other designated or special interest areas at the federal, state, and local level in the vicinity of the proposed Project facilities. The areas that would be crossed by the Project or that would be within 0.25 mile of the construction right-of-way are listed in appendix G-14.

During pipeline construction, expected impacts on public lands identified in appendix G-14 include those associated with increased traffic, noise, and dust, as well as on visual resources; however, these would be temporary and limited to the time of construction.

One of the primary concerns when crossing recreation and special interest areas is the impact of construction on the recreational activities, public access, and resources the interest areas aim to protect. Construction would alter visual aesthetics by removing existing vegetation and disturbing soils. Construction would also generate dust and noise, which could be a nuisance to recreational users, and may interfere with or diminish the quality of the recreational experience by affecting wildlife movements or disturbing trails.

In general, Project impacts on recreational and special interest areas occurring outside of forest land would be temporary and limited to the period of active construction, which typically lasts several weeks or months in any one area. These impacts would be minimized by implementing the measures in PennEast's E&SCP. Traffic-related impacts would be minimized through implementation of the measures in PennEast's Traffic Management Plan (see section 4.7.1.1). Noise mitigation measures that would be employed during construction include ensuring that the sound muffling devices, which are provided as standard equipment by the construction equipment manufacturer, are kept in good working order. To control fugitive dust during construction, PennEast would apply water or other commercially available dust control agents on unpaved areas subject to frequent vehicle traffic in accordance with the Project's Fugitive Dust Control Plan.

Following construction, most open land uses would be allowed to revert to their former uses. Forest land affected by the temporary construction right-of-way and ATWS areas, however, would experience long-term impacts because of the time required to restore the woody vegetation to its preconstruction condition. Further, forest land within the new permanent right-of-way would experience permanent impacts because it would be precluded from being reestablished within the maintained portion of the right-of-way. Project facilities were sited so that about 44.5 miles (27.0 miles in Pennsylvania and 17.5 miles in New Jersey), or about 39 percent, of the 115.0-mile-long pipeline route would be constructed adjacent to existing rights-of-way (see section 2.2.1). To minimize environmental impact and maintain visitor access safety to the greatest extent possible at public lands, recreation areas and other public interest areas, **we recommend that:**

- **<u>Prior to the end of the draft EIS comment period</u>, PennEast should file with the Secretary an update of the status of the development of the site-specific crossing plans for each of the recreation and special interest areas listed as crossed by the Project or otherwise affected in appendix G-14. The site-specific crossing plans should include, as applicable:**

  1) site-specific timing restrictions;
  2) proposed closure details and notifications (e.g., reroutes, signage, public notices);
  3) specific safety measures; and/or
  4) other mitigation to be implemented to minimize effects on the recreation areas and their users during construction and operation of the Project.

Areas requiring additional site-specific considerations are discussed in detail below by state.

Implementation of the measures discussed in this section would minimize or eliminate impacts on most of the public lands, recreational areas, and other public interest areas identified in appendix G-14.

4.7.5.1 Federal Lands

Pennsylvania

<u>USACE Lands</u>

As part of the Section 408 approval process, PennEast would obtain easements for crossing the USACE-owned parcels of the Project. PennEast has been in contact with the USACE government real estate office in Baltimore to obtain a temporary license for survey access and to discuss the process to obtain easements on the parcels. PennEast submitted a Section 408 application specific to crossing Beltzville Dam and Francis E. Walter Dam to the USACE Philadelphia District on February 5, 2016. On April 21, 2016 the USACE issued public notices to solicit comments and recommendations from the public about the issuance of a permit for PennEast's proposed crossing of USACE projects. The public comment period concluded on June 20, 2016. PennEast continues to coordinate with government real estate office staff and it intends to submit an Application for Transportation and Utility Systems and Facilities on Federal Land (Standard Form 299) in the second quarter of 2016.

In response to USACE concerns regarding safety of park visitors, PennEast has committed to implementing a work plan as a component of the Section 408 approval. Prior to construction within USACE property, signs and exclusionary fencing would be installed along the edge of approved work areas to provide a clearly defined boundary and buffer zone for construction crews and the public. Temporary signage and fencing would be maintained throughout the course of construction. A team of safety professionals would be onsite during site preparation and Project construction to prevent entry of unauthorized personnel, enforce safe working procedures, and assess safety of the work zone.

Francis E. Walter Dam

Francis E. Walter Dam is a 1,800-acre project consisting of an 80-acre reservoir and recreational area located in Luzerne and Carbon counties, Pennsylvania and managed by USACE. No USACE-operated recreational facilities are present; however, a boat launch area exists and the site is open to picnicking, hiking, and fishing.

The Project would cross a reservoir and recreational area associated with the Francis E. Walter Dam between MPs 23.0 and 23.1 for about 825 feet in Luzerne and Carbon Counties, Pennsylvania. About 2.3 acres of lands associated with the Francis E. Walter Dam would be affected by construction of the Project (temporary right-of-way, ATWS, and permanent right-of-way) and 0.9 acre would be located in the permanent right-of-way. The entire portion of the PennEast pipeline at this location would be co-located within an existing product pipeline right-of-way owned by Buckeye Partners, LP.

Beltzville State Park

Beltzville State Park is a 3,002-acre park with recreational facilities, jointly managed by the USACE, Pennsylvania Department of Conservation, and the PGC. The USACE operates and maintains the dam while recreation is managed by PADCNR under a lease agreement with the Pennsylvania Bureau of State Parks. The park is situated around the 949-acre Beltzville Lake and hosts 15 miles of hiking trails, 2.5 miles of mountain biking trails, and is open to a range of recreational activities including swimming, boating, fishing, hunting, cross country-skiing, and water-skiing.

PennEast would use HDD methodology to cross the two waterbodies associated with the Beltzville Lake between MPs 43.2 and 44.4 for about 6,100 feet in Carbon County, Pennsylvania. The entire crossing would be completed with one HHD. The Project would cross the Christman, Cove Ridge, and Falls trails, along with the Waterfall area and Wild Creek cove. About 9.6 acres of lands associated with Beltzville State Park would be affected by the construction of the Project (temporary right-of-way, ATWS, and permanent right-of-way) and 5.6 acres would be located in the permanent right-of-way. The use of HDD would avoid direct impacts on Wild Creek and Pohopoco Creek, adjacent wetlands, surrounding forested uplands, and recreational facilities. The drill entry point would be sited in an open field adjacent to an upland forested area within the Beltzville State Park boundaries. The drill exit point would be located on a property south of the USACE-owned property. The permanent right-of-way over the area installed by HDD would not be cleared for Project operations. Minor hand clearing would be completed in areas crossed by the HDD to maintain a clear line of sight between pipeline markers. There would be no mechanized clearing, vegetation spraying, or earth disturbance in areas crossed by HDD.

Impacts on the trail users would be temporary during construction and all trails would be restored to their original condition following construction activities. In order to minimize the impacts on these highly used recreational areas, PennEast would keep a 300-foot recreational and aesthetic buffer around these areas, and adhere to any vegetation management requests of PADCNR. This mitigation and minimization plan would be developed in conjunction with PADCNR to limit restriction of visitor access.

Appalachian National Scenic Trail

The Appalachian National Scenic Trail is a roughly 2,180-mile continuous public hiking trail that extends from Georgia to Maine passing through 14 states along the Appalachian mountain range. The Appalachian National Scenic Trail was completed in 1937 and is a unit of the National Park System, but is managed under a unique partnership between public and private entities including the National Park Service (NPS), United States Forest Service, numerous state agencies, the Appalachian Trail Conservancy (ATC), and 31 local clubs that mark and maintain the trail.

The Project would cross the Appalachian National Scenic Trail near MP 51.2 in Carbon County, Pennsylvania on properties owned by the Pennsylvania Game Commission. PennEast would bore under the Appalachian National Scenic Trail to minimize tree clearing and ground disturbance near the trail. The proposed crossing would not be co-located within or adjacent to existing utility easements and land at this location has not been previously disturbed or developed. PennEast is proposing to use a trenchless crossing (HDD/direct pipe) to avoid impacts on the viewshed within the 400-foot-wide Appalachian National Scenic Trail Corridor.

PennEast considered six alternative crossing locations of the Appalachian National Scenic Trail, and has developed a site-specific crossing plan at this location, after considering comments and perspectives shared by NPS, ATC, PGC and other stakeholders for the crossing of the Appalachian National Scenic Trail. We have reviewed this crossing plan and find it acceptable; however, PennEast continues to consult with appropriate Federal and State agencies and other stakeholders regarding measures to minimize impacts on trail users. PennEast is responsible for obtaining the pertinent permits from the appropriate authorities for crossing the Appalachian National Scenic Trail at this location.

New Jersey

No federal lands would be crossed by or located within 0.25 mile of the Project facilities in New Jersey.

4.7.5.2 State Lands

Pennsylvania and New Jersey state-owned lands are discussed in the following sections.

Pennsylvania State Lands

Appendix G-14 summarizes Pennsylvania state lands that would be crossed by or located within 0.25 mile of the Project facilities. State parks and state forests in Pennsylvania are managed by PADCNR. State forests are managed by the Bureau of Forestry, which is a subdivision of PADCNR, while state game lands are managed by the PGC. According to the *Guidelines for*

Right-of-Way Development on Pennsylvania State Forest and State Park Lands (2009), to construct a pipeline on state forest and park lands for which they do not hold such rights, PennEast must obtain a License for Right-of-Way, which would require coordination with the PADCNR Bureau of Forestry Central Office and the Weiser State Forest District (PADCNR 2009). PennEast met with representatives from PADCNR on November, 4, 2014 and the PGC on September 24, 2014 to discuss survey on state-managed lands and the process for obtaining right-of-way agreements to cross state parks, forests, and game lands. Although there would be temporary impacts and potential disruption during construction, following pipeline installation all activities and access currently available to the public would be returned to their original state. Topography would be restored to pre-construction conditions and be vegetated with grass and plant species that are native to the area and tree growth within the temporary work space areas would be allowed to re-vegetate naturally. PennEast states that it is prepared to take the appropriate measures to minimize the amount of restrictions to visitor access during construction. During operations, there would be nothing that would prevent public access to or normal state administration of the state-owned lands.

Frances Slocum State Park

Frances Slocum State Park is a 1,035-acre park which contains a 165-acre lake that is popular for boating and fishing, and home to many species of wildlife. Recreational opportunities at the park include hiking, mountain biking, picnicking, swimming, boating, fishing, hunting, ice fishing, and camping, as well as the Patrick J. Solano Environmental Education Center.

The Project would cross Frances Slocum Sate Park, owned and maintained by PADCNR, between MPs 2.1 and 2.4 for about 1,702 feet in Luzerne County, Pennsylvania. About 5.3 acres of lands associated with Francis Slocum State Park would be affected by the construction of the Project (temporary right-of-way, ATWS, and permanent right-of-way) and 2.0 acres would be located in the permanent right-of-way. The crossing location would avoid the lake and associated recreational facilities; however, it would be located adjacent to portions of the Maconaquah Trail, a popular mountain bike trail. Construction would alter visual aesthetics by removing existing vegetation and disturbing soils. Construction would also result in dust and noise, which could be a nuisance to recreational users, and trail use may be temporarily restricted due to safety concerns. Impacts would be temporary during construction and the area would be restored to pre-construction conditions after construction is completed.

Hickory Run State Park

Hickory Run State Park is a 15,990-acre park with over 40 miles of hiking trails, three state park natural areas, the Boulder Field Natural Area, numerous trout streams, and a picnic area and campground. Recreational activities within the park include hiking, swimming, fishing, hunting, disc golf, orienteering, cross-county skiing, snowmobiling, and ice skating.

The Project would cross Hickory Run State Park, owned and maintained by PADCNR, between MPs 29.1 and 29.9 and MPs 30.3 and 34.7 for about 18,622 feet in Carbon County, Pennsylvania. About 45.0 acres of lands associated with Hickory Run State Park would be affected by the construction of the Project (temporary right-of-way ATWS, and permanent right-of-way) and 21.4 acres would be located in the permanent right-of-way. Construction would alter visual aesthetics by removing existing vegetation and disturbing soils. Construction would also result in dust and noise, which could be a nuisance to recreational users, and trail use may be temporarily restricted due to safety concerns. However, the Project would be co-located with an existing pipeline through the Hickory Run State Park which would minimize additional impacts. The Project would not cross mapped trails within Hickory Run State Park and would not cross the Boulder Field Natural Area (PADCNR 2012). Impacts would be temporary during construction and the area would be restored to pre-construction conditions after construction is completed.

Beltzville State Park

As described in section 4.7.5.1 (Federal Lands), Beltzville State Park is a cooperative effort of the USACE, PADCNR, and PGC. However, the Project does not cross any state-owned lands in this park. A description of the park and proposed Project crossing is presented in section 4.7.5.1 (Federal Lands) above.

Delaware Canal State Park

Delaware Canal State Park is located along the Delaware River between Easton and Bristol, Pennsylvania, along the 60-mile-long historic towpath. The park offers canoeing, boating, fishing, hiking, biking, cross-country skiing, and archery hunting.

The proposed pipeline would cross Delaware Canal State Park near MP 77.6 for an approximate crossing length of 185 feet in Bucks County, Pennsylvania. About 0.2 acre of lands associated with Delaware Canal State Park would be affected by the construction of the Project (temporary right-of-way, ATWS, and permanent right-of-way) and 0.2 acre would be located in the permanent right-of-way.

PennEast would cross the Delaware River and surrounding Delaware Canal State Park with a HDD. PennEast plans to file both pre-construction and post-construction canal and canal structure condition reports prepared by a qualified independent company and approved by PADCNR for 1 mile north and 1 mile south of the crossing site. Equipment staging areas, entrance and exit points, and depth of the HDD below the canal would be presented and discussed with PADCNR State Park Manager prior to permitting and construction.

State Game Land No. 91

The Project would cross State Game Land No. 91 beginning at MP 17.7 in Luzerne County, Pennsylvania, for a length of about 14,738 feet. About 46.2 acres of lands associated with State Game Land No. 91 would be affected by the construction of the Project (temporary right-of-way, ATWS, and permanent right-of-way) and 12.1 acres would be located in the permanent right-of-way. The Project would not cross any existing trails (PGC 2015). The Project route would be co-located with an existing pipeline right-of-way; therefore, only minor permanent impacts on forests within State Game Land No. 91 would be anticipated as a result of tree clearing for the Project, and no further mitigation would be required.

State Game Land No. 40

The Project would cross State Game Land No. 40 beginning at MP 24.9 in Carbon County, Pennsylvania, for a length of about 5,005 feet. About 16.6 acres of lands associated with State Game Land No. 40 would be affected by the construction of the Project (temporary right-of-way, ATWS, and permanent right-of-way) and 5.7 acres would be located in the permanent right-of-way. The Project route would be co-located with an existing pipeline right-of-way; therefore, only minor impacts on State Game Land No. 40 would be anticipated as a result of tree clearing for the Project, and no further mitigation would be required.

State Game Land No. 129

The Project would cross State Game Land No. 129 beginning at MP 29.9 in Carbon County, Pennsylvania, for a length of about 2,510 feet. About 5.8 acres of lands associated with State Game Land No. 129 would be affected by the construction of the Project (temporary right-of-way, ATWS, and permanent right-of-way) and 2.9 acres would be located in the permanent right-of-way. The Project would not cross any existing trails. The Project route would be co-located with an existing pipeline right-of-way; therefore, only minor impacts on State Game Land No. 129 are anticipated as a result of tree clearing for the Project, and no further mitigation would be required.

State Game Land No. 168

The Project would cross State Game Land No. 168 beginning at MP 50.8 in Carbon and Northampton Counties, Pennsylvania, for a length of about 2.1 miles. About 37.4 acres of lands associated with State Game Land No. 168 would be affected by the construction of the Project (temporary right-of-way, ATWS, and permanent right-of-way) and 12.8 acres would be located in the permanent right-of-way. The Project route would affect State Game Land No. 168 as a result of tree clearing. PennEast staff met with members of the PGC on May 21, 2015 and July 18, 2015 to discuss the crossing of the Appalachian National Scenic Trail and State Game Land No. 168. PennEast would continue to coordinate with the PGC to determine acceptable timing, BMPs to construct the pipeline, and suitable measures to minimize disturbance to recreational areas and its visitors. Mitigation and compensation for lands would be addressed through right-of-way negotiations and licensing agreements.

Weiser State Forest, Penn Forest Tract

Weiser State Forest, located in the ridge-and-valley region of eastern Pennsylvania covers about 30,000 acres on 16 tracts. The state forest offers hiking, picnicking, camping, hunting, fishing, boating, and other recreation opportunities for visitors.

The Project would cross the Penn Forest Tract of Weiser State Forest beginning at MP 35.3 in Carbon County, Pennsylvania for a length of about 3,523 feet. About 10.3 acres of lands associated with Weiser State Forest would be affected by the construction of the Project (temporary right-of-way, ATWS, and permanent right-of-way) and 4.0 acres would be located in the permanent right-of-way. PennEast would apply the appropriate Aesthetic Management Zone setbacks in order to minimize impacts on connectivity and aesthetics of the area. The Project alignment would be co-located with an existing transmission line right-of-way for the majority of the crossing. Although impacts associated with tree clearing in Weiser State Forest would be minor, the associated risk of illegal riding of all-terrain vehicles on state forest lands is a top concern for recreational forest management (PADCNR 2013), and cleared rights-of-way could provide additional access which is both a safety and environmental concern that has been raised by numerous comments received on the Project. Therefore, **we recommend that:**

- **Prior to construction, PennEast should file with the Secretary, for review and written approval by the Director of the OEP, plans regarding a gating or boulder access**

system for the pipeline right-of-way across state lands, developed in consultation with PADCNR, to prevent unauthorized vehicle access while maintaining pedestrian traffic.

New Jersey State Lands

The PennEast Project would not cross any New Jersey state parks or state forests; however, the Project would cross numerous parcels owned by the NJDEP, 22 parcels associated with the Green Acres program, and lands managed by New Jersey Natural Lands Trust (appendix G-14).

In areas where recreational areas or temporary impacts on state-owned lands cannot be avoided, general impact minimization and mitigation measures, which may be fine-tuned to match site specific conditions, are described in section 4.7.5.2. Construction would result in alteration of visual aesthetics, dust and noise nuisance, and temporary public access restrictions due to safety concerns. Impacts would generally be temporary during construction and the area would be restored to pre-construction conditions after construction is completed.

Because there is no legal procedure in place by which PennEast could obtain the necessary easement rights across preserved lands, PennEast may pursue condemnation. If PennEast's Project is certificated by the Commission, PennEast would be authorized by NGA section 7(h) to exercise the right of eminent domain to acquire the necessary rights-of-way and easements for the pipeline and appurtenant facilities. Alternatively, PennEast may seek to obtain the necessary easement rights across preserved areas from the fee owners, if the areas can be preempted and deemed non-applicable to interstate natural gas pipelines. Regardless of the easement acquisition process, PennEast would restore the property of the fee owner for all farms (whether preserved or not) so that recreational use may continue over the pipeline after construction is complete. If the Commission authorizes the Project, any non-federal permit or requirements would need to be consistent with the conditions of the Certificate. The Commission encourages cooperation between interstate pipelines and local authorities. However, if such authorities prohibit or unnecessarily delay PennEast from meeting its obligations under the authorizing Order, their requirements would be preempted by the certificate. PennEast would be required to comply with all reasonable requirements of a state or local approval.

Green Acres Program

The Green Acres Program's mission is a partnership at the local and state level, and provides a system of interconnected open spaces whose protection will preserve and enhance New Jersey's natural environment and historic, scenic, and recreational resources for public use and enjoyment. Through New Jersey's Green Acres Program, local government units or nonprofits can receive funding for the acquisition of land for public recreation and conservation purposes (NJAC 7:36-3.1 and 15.1). After land is protected through the Green Acres Program, the local government unit or nonprofit must receive approval from the Commissioner of the NJDEP and the State House Commission to divert the land to a use other than recreation and conservation purposes.

There would be 22 parcels of land located within the proposed PennEast pipeline route that have been identified as being Green Acres-encumbered lands. These parcels are located in Hopewell, Holland, Alexandria, West Amwell, Delaware, and Kingwood Townships. Of the Green Acres-encumbered parcels, the route would be co-located with existing utilities for 85 percent of the route to minimize visual and environmental impacts. Impacts associated with construction of the Project would be temporary and would not permanently impair the open space and recreational purpose of these parcels. The Project would result in the temporary closure of one trailhead parking lot and limitations on use of trails near the Project's workspace in order to protect public safety.

As required by Green Acres regulations, PennEast would provide the required alternative analysis for each of these parcels to NJDEP for review. PennEast would also adhere to mitigation requirements which state that impacts of the diversion of parkland must be mitigated by securing replacement parkland acreage at a ratio of 4:1 or by providing monetary compensation at a land value ratio of 10:1.

New Jersey Natural Lands Trust

The New Jersey Natural Lands Trust was created in 1968 as an independent agency within, but not of, NJDEP with the mission of preserving land in its natural state for public enjoyment and to protect natural diversity. Land acquisition occurs primarily thorough donation of land and easements. In accordance with their policies, the New Jersey Natural Lands Trust has strict guidelines against the transfer or diversion of New Jersey Natural Lands Trust lands unless the transferee is a local government unit, nonprofit, or state or federal agency whose primary purpose is to maintain lands for recreation or conservation purposes (NJNLT 2014). The Project would avoid Milford Bluffs Preserve and Alexauken Preserve. The Project would cross about 2.7 miles of land managed by the New Jersey Natural Lands Trust, including the Gravel Hill Preserve and the Ted F. Stiles Preserve, of which about 2 miles would be collocated adjacent to existing transmission or pipeline rights-of-way. The Project would also cross a portion of the Wickecheoke Creek Greenway, specifically the Lower Creek Road trail, which is preserved under a partnership with New Jersey Conservation Foundation.

General Impact Minimization and Mitigation Measures on State Lands

In areas where recreational areas or temporary impacts on state-owned lands cannot be avoided, general impact minimization and mitigation measures proposed by PennEast would include:

- installation of signs and exclusion fencing along the edge of approved work areas to provide a clearly defined boundary and buffer zone for construction crews and the public throughout the course of construction;
- utilization of safety professionals to be present onsite during site preparation and Project construction to prevent entry of unauthorized personnel into work areas, enforce safe working procedures, and assess safety in the work zone;
- management of woody debris in ways that would not affect aesthetic value or adversely affect forest growth;
- maintaining adequate recreational and aesthetic buffers around recreational areas as specified in the approved permits and limit tree removal in these areas;
- conducting stream crossings during winter months or low flow conditions to allow for quick construction, and otherwise reduce the possibility of downstream sedimentation and impacts on recreation including fishing and boating;

- coordination with the appropriate personnel including PADCNR State Park Managers and District Foresters to develop the construction schedule, coordinate road improvements, coordinate temporary road or trail closures, and identify special events or hunting seasons which may restrict pipeline construction activities;.
- coordination with the appropriate personnel including PADCNR and co-located transmission line owners to develop gating and bouldering systems to prevent unauthorized vehicle access as needed; and
- use of BMPs to limit the introduction of invasive species and development of an invasive species management plan.

With implementation of the above measures, as well as with our recommendations described above, and with any additional requirements by state and local approvals, that impacts on state lands would be appropriately minimized.

4.7.5.3 County and Municipal Lands

Appendix G-14 also includes a summary of county and municipal lands that would be crossed by the Project and provides details on the location of the crossing by MP, length of crossing, and summary of land affected by construction and operation of the Project facilities. Examples of county lands include parcels owned by the Luzerne County Redevelopment Authority, which were acquired to improve the existing land uses, and parcels owned by Lehigh County and Mercer County, which were acquired to increase preserved lands in these counties. Examples of municipal lands include parcels that provide protection to public water supply reservoirs (e.g., the Bethlehem Authority lands in Penn Forest Township) and parcels that were obtained to increase preserved lands in the townships (e.g., Easton City in Pennsylvania and Holland Township in New Jersey). About 7.13 miles of county and/or municipal lands would be crossed by the Project. Of these lands, a total of 113.5 acres would be affected by temporary construction (temporary right-of-way, ATWS, and permanent right-of-way) and 42.9 acres would be located in the permanent Project right-of-way. Although there would be temporary impacts and potential disruption during construction, following pipeline installation all activities and accesses currently available to the public would be returned to their original state. Topography would be restored to pre-construction conditions and be vegetated with grass and plant species that are native to the area and tree growth within the temporary work space areas would be allowed to re-vegetate naturally. During operations, public access would be maintained and normal administration of these lands would continue.

4.7.5.4 Land Conservation Programs

Appendix G-17 summarizes lands that would be crossed by the Project that are encumbered by private conservation easements. Examples of these private conserved lands include lands managed by specific land conservancies such as The Nature Conservancy lands in Penn Forest and Towamensing Townships, and Hunterdon Land Trust in Kingwood Township. Other private conserved lands are associated with state (e.g., New Jersey Conservation Foundation), county (e.g., Carbon County open space and Northampton County agricultural easements), and municipal funding (e.g., West Amwell and Hopewell Townships New Jersey). About 7.8 miles of private lands with conservation easements would be crossed by the Project. Of these lands, about 122.8 acres would be affected by temporary construction (temporary right-of-way, ATWS, and permanent right-of-way) and 47.4 acres would be located in the permanent Project right-of-way.

Although there would be temporary impacts and potential disruption during construction, following pipeline installation all activities and accesses currently available to the public would be returned to their original state. Topography would be restored to pre-construction conditions and be vegetated with grass and plant species that are native to the area and tree growth within the temporary work space areas would be allowed to re-vegetate naturally. During operations, there would be nothing that would prevent public access to or normal administration of these lands. The limited permanent easement area that PennEast would acquire for pipeline installation and operation would lose its conservation status, but only in that PennEast would acquire the development rights to install and maintain the pipeline in this easement. The majority of the land area that is subject to conservation easement restriction would retain its conservation restriction status outside of PennEast's permanent right-of-way, following construction.

We received a comment from the USDA regarding Farm and Ranch Land protection Program (FRPP) easements. The Project would impact one FRPP easement, the Setzer property in Northampton County, Pennsylvania, for which an easement was executed in 1999. The purpose of the FRPP program is to protect valuable farm and ranch lands for future generations by limiting nonagricultural uses of the land. The terms of the easement allow for a right-of-way for specific utilities; however, additional acreage for any other activity disturbing the surface, including staging and/or storage, is not permitted.

PennEast would also impact one additional USDA conservation easement in Pennsylvania and three in New Jersey. The parcel in Pennsylvania, PE-NO-147.000, would be located at approximate MP 65.2. The Project would cross this parcel for a distance of 294 feet. PennEast would employ agricultural construction techniques at this location, such as topsoil segregation and extra depth burial. Because these are federal easements, PennEast must obtain USDA approval to construct across these easements. Following construction, the easement area would be restored to the USDA's requirements, thereby minimizing or eliminating impacts on the land encumbered by the conservation easement. The three USDA-encumbered parcels in New Jersey that would be impacted by the Project are: (1) Parcel PE-HU-A040.000, which would be located at MP 79.9 where the proposed alignment would cross this parcel for a distance of 669 feet; (2) Parcel PE-HU-171.000, which would be located at MP 97.3 where the proposed alignment would cross this parcel for a distance of 1,264 feet; and (3) Parcel PE-ME-027.000, which would located at MP 108.75 where the proposed construction right-of-way (ATWS) would impact a 0.02-acre portion of the parcel. PennEast is currently analyzing the three USDA-encumbered parcels in New Jersey to determine methods for avoidance by the implementation of various deviations, such as by routing changes or modification of the construction right-of-way footprint. W**e recommend that:**

- **<u>Prior to the end of the draft EIS comment period,</u> PennEast should file with the Secretary documentation of USDA approval for construction and operation of the Project within any and all parcels affected that have active USDA conservation easements. Alternatively, PennEast should identify any Project changes made to avoid parcels with USDA conservation easements, and include documentation of consultation with the USDA that confirms avoidance of USDA conservation easements.**

4.7.5.5 Private Recreational and Special Use Areas

Recreational and other designated special use areas may include campgrounds, golf courses, race tracks, quarries, churches, and other recreational areas. A total of 50 private recreational and special use areas would be located within 0.25 mile of the Project facilities (Appendix G-18). Of those 50 areas, both temporary and permanent impacts would occur to three areas including the Blue Mountain Ski Area and Calvary Baptist Church. PennEast's current alignment through the Calvary Baptist Church property is located within an existing utility easement.

Through discussions with Blue Mountain Ski Area, PennEast has identified several minimization measures including, but not limited to, extra depth burial to mitigate snow melting along ski slopes, locating the pipeline within and along boundary roadway and parking areas, and coordinating pipeline construction schedule with use of the ski area.

4.7.6 Hazardous Waste Sites

PennEast contracted with EDR to conduct a review of federal and state government databases to identify additional potentially contaminated sites that may not have been uncovered during PennEast's initial desktop review of publicly available websites and databases. Table 4.3.1-8, in section 4.3.1.7 of this EIS, identifies the sites identified by the EDR report as being crossed by or occurring within the Project workspace. The potential for impacts due to disturbance of existing contamination is discussed in section 4.3.1.7 of this EIS.

PennEast would implement the protocols in its SPCC Plan and Unanticipated Discovery of Contaminated Soils Standard Operating Procedures if contamination is encountered during construction. We have reviewed these documents and find them to be acceptable. In general, if unanticipated contamination is encountered or suspected during construction, all construction work in the immediate vicinity would be stopped until an appropriate course of action is determined.

4.7.7 Visual Resources

No registered natural landmarks, wilderness areas designated under the Wilderness Act, or scenic byways would be crossed or located within 0.25 mile of the Project.

4.7.7.1 Pipeline Facilities

Visual resources along the proposed pipeline routes are a function of geology, climate, and historical processes, and include topographic relief, vegetation, water, wildlife, land use, and human uses and development. About 44.5 miles (27.0 miles in Pennsylvania and 17.5 miles in New Jersey), or about 39 percent of the 115.0-mile-long pipeline route, would be constructed adjacent to existing rights-of-way (see section 2.2.1). As a result, the visual resources along these portions of the Project have been previously affected by other forms of infrastructure.

Visual impacts associated with the Project construction right-of-way and ATWS would include the removal of existing vegetation and the exposure of bare soils, as well as earthwork and grading scars associated with heavy equipment tracks, trenching, blasting, and machinery and tool storage. Other visual effects could result from the removal of large individual trees that have intrinsic aesthetic value; the removal or alteration of vegetation that may currently provide a visual barrier; or landform changes that introduce contrasts in visual scale, spatial characteristics, form, line, color, or texture.

Visual impacts would be greatest where the pipeline route parallels or crosses roads and the pipeline right-of-way could be seen by passing motorists, from residences where vegetation used for visual screening or for ornamental value would be removed, and where the pipeline route would traverse through forested and/or recreational areas. The duration of visual impacts would depend on the type of vegetation that is cleared or altered. The impact of vegetation clearing would be shortest in open areas where the re-establishment of vegetation following construction would be relatively fast (generally less than five years). The impact would be greater in forest land, which would take many years to regenerate. The greatest potential visual impact would result from the removal of large specimen trees, which would take longer than other vegetation to regenerate and would be prevented from re-establishing on the permanent right-of-way.

The area that would be crossed by the pipeline facilities is a highly fragmented landscape, comprising mostly a mixture of open land, residential areas, forest/woodland, industrial/commercial development, and agricultural land. Additionally, as discussed above, a portion of the proposed pipeline routes would be located within or adjacent to the existing rights-of-way. These factors would minimize the visual impact of construction. The visual effect of the pipeline would also be mitigated by the HDD crossings, where impacts on visual resources between the HDD entry and exit holes would be avoided.

After construction, all disturbed areas would be restored and returned to preconstruction conditions in compliance with federal, state, and local permits, landowner agreements, and PennEast's easement requirements with the exception of aboveground facility sites. A 30-foot-wide operation right-of-way in upland forests (10-foot-wide in wetlands) would be maintained, requiring the permanent removal of trees in these forested areas. Forest/woodland within the new maintained permanent right-of-way would be permanently converted to a non-forested condition.

The Hickory Run Boulder Field located within Hickory Run State Park, Pennsylvania is listed as a National Natural Landmark; however, the Project would be located about 0.5 mile from Hickory Run State Park, and dense forest/woodland would provide visual screening. Additionally, the Project would be co-located with an existing product pipeline for the entire crossing through Hickory Run State Park. Therefore, no impacts on visual or aesthetic resources would result from construction and operation of the Project.

We received comments regarding the potential for visual impacts on recreational users at Jack Frost Ski Resort and National Golf Club, located adjacent to Hickory Run State Park. The proposed route would be co-located with an existing right-of-way in the vicinity of these areas. Additionally, the Project would be located at least 0.75 mile from the closest fairway and at least 1 mile from the closest ski slope; therefore, no impacts on visual or aesthetics resources would result from construction and operation of the Project.

The pipeline would cross the Appalachian National Scenic Trail on property owned by the Pennsylvania Game Commission with a current land use of upland forest. The proposed crossing would not be co-located within or adjacent to existing utility easements and land at this location has not been previously disturbed or developed. PennEast is proposing to use a trenchless crossing (HDD/direct pipe) to avoid impacts on the viewshed within the 400-foot-wide Appalachian

National Scenic Trail Corridor. As stated in section 4.7.5.1, PennEast is coordinating with applicable Federal and State agencies and organizations including National Park Service, Appalachian Trail Conservancy, and the Pennsylvania Game Commission regarding the crossing location and appropriate mitigation measures to reduce impacts on trail users during construction and operation of the Project.

The Sourlands is a region in New Jersey that includes portions of Hunterdon, Mercer, and Somerset Counties. It is centered on Sourland Mountain and comprises parts of Lambertville, East Amwell, West Amwell, Hillsborough, Hopewell Borough, Hopewell Township, and Montgomery townships. The 90-square-mile region contains the largest contiguous forest in Central New Jersey. The sparsely populated area encompasses a complex ecosystem of forest, wetlands, and grasslands. Its variety of habitat supports a rich diversity of animal and plant species, including species of concern under state and federal regulations. The forest is especially important as a breeding area for migratory songbirds, particularly those who nest only in large wooded areas.

We acknowledge the ecological significance of areas of the Sourland Mountain region in New Jersey, and PennEast attempted to route during the siting process to avoid potential impacts on undisturbed forests such as those of the Sourland Mountain region. PennEast would co-locate the construction right-of-way adjacent to or in proximity to an existing utility right-of-way in this area to reduce fragmentation of undisturbed forested areas in the Sourland Mountains region. We evaluated one route alternative that would avoid the Sourland Mountain region, following adjacent to the existing Transco Leidy Line at the northeast edge of the region (see section 3.3.1.2).

The Project would cross the Sourlands for about 9.5 miles within the Highlands Planning Area in parts of Holland and Alexandria Townships, New Jersey. The Highlands Planning Area is a portion of the Highlands Region, an over 800,000-acre region located in Bergen, Hunterdon, Morris, Passaic, Somerset, Sussex and Warren Counties, New Jersey. This area provides an essential source of drinking water for half of New Jersey residents. The Highlands Planning Area is distinct from the Highlands Preservation Area, which is the portion of the Highlands Region that has exceptional natural resource value. The Project would cross the Sourlands for about 0.75 mile to the east from the Goat Hill Overlook, which provides views of the Delaware River to the west. Since the Project would be separated from the overlook by about 0.75 mile of mature forest and the proposed route would be co-located or in proximity to an existing utility right-of-way in this area, we do not anticipate that the Project would have any significant impacts on the viewshed.

4.7.7.2 Aboveground Facilities

Aboveground facilities would be the most visible features constructed as part of the Project, and would result in a long-term change to the appearance of the landscapes where they are located. Aboveground facilities associated with the Project consist of the Kidder Compressor Station, various launcher/receiver sites, interconnects, lateral tap sites, and 11 MLV locations.

The compressor station would be located in previously logged, disturbed forest in Carbon County, Pennsylvania. Visual disturbance would be limited to vegetation clearance for the access road off Pennsylvania Route 940 and partial views of the site from Interstate 80. PennEast has selected a 60-acre site for the compressor station, of which only 34 acres would be permanently disturbed for construction and operation of the Kidder Compressor Station. The remainder of the site would not be utilized for the compressor station, related facilities, and access, and would remain undisturbed as buffer and/or mitigation lands. We find that the retention of trees and shrubs around the perimeter of the 60-acre compressor station site would provide sufficient cover to avoid any significant adverse visual impacts.

4.7.7.3 Pipe and Contractor Ware Yards

With the possible exception of minor grading activities and surfacing, soils at the pipe and contractor ware yards would not be disturbed. As a result, there would be no permanent impacts on visual resources associated with the use of these yards. The only impacts at yards would be temporary during construction, when trailers, vehicles, pipe, and other construction-related material would be stored at these sites.

4.7.7.4 Access Roads

PennEast proposes to use 116 roads for temporary access to the Project facilities during construction, 11 of which would be used for permanent access to the Project facilities during operation. Of the 116 access roads 100 are existing or partially existing roads, 55 of which would require improvements. The existing or partially existing roads are mostly comprised of gravel roads, dirt roads, and paved roads. All temporary access roads used for construction would be restored in accordance with landowner agreements after construction. Therefore, visual impacts due to the use of existing roads and/or construction or enhancement of additional roads would be limited in duration.

4.8 SOCIOECONOMICS

The Project would cross six counties in two states. More than two-thirds (78.6 miles; 68 percent) of the 115.1-mile pipeline would be located in four counties in Pennsylvania (Luzerne, Carbon, Northampton, and Bucks counties), with the remaining 36.3 miles (32 percent of the total pipeline length) located in two counties in New Jersey (Hunterdon and Mercer counties). Viewed by county, miles per county range from just 1.7 miles (Bucks County, Pennsylvania) to 28.1 miles (Carbon County, Pennsylvania).

The Project would include an approximately 2.1-mile pipeline lateral in Northampton County, Pennsylvania (the 24-inch Hellertown Lateral), and two additional laterals in Hunterdon County, New Jersey (the 0.1-mile, 12-inch Gilbert Lateral and the 1.5-mile, 36-inch Lambertville Lateral). The Project also includes a proposed compressor station at approximate MP 26.6 in Kidder Township, Carbon County, Pennsylvania. Other aboveground facilities including meter stations, mainline valves, and pig launcher/receivers would be installed at various locations along the new pipeline system.

This section discusses existing conditions and assesses potential impacts on population, the economy and employment, housing, public services, public utilities and related infrastructure, transportation and traffic, property values and insurance, tax revenues, and environmental justice. Existing conditions are based on the latest publically available compiled data, which is 2014 for most statistics but earlier years for some.

4.8.1 Population

The six counties that would be crossed by the Project had a total combined population of approximately 1.8 million in 2014, with 72 percent of this total located in the four Pennsylvania counties (Luzerne, Carbon, Northampton, and Bucks), and the remaining 28 percent located in the two New Jersey counties (Hunterdon and Mercer) (table 4.8.1-1). Population by county in Pennsylvania ranged from 64,441 in Carbon County to 626,685 in Bucks County. In New Jersey, Hunterdon and Mercer counties had respective 2014 populations of 126,067 and 371,537 (table 4.8.1-1).

Population densities by affected county in Pennsylvania in 2014 ranged from 169 persons per square mile (persons/square mile) in Carbon County to 1,037 persons/square mile in Bucks County. Population densities in the affected New Jersey counties were 295 persons/square mile (Hunterdon County) and 1,655 persons/square mile (Mercer County) (table 4.8.1-1). The corresponding statewide densities in 2014 were 286 in Pennsylvania and 1,215 in New Jersey, compared to the national average density of 90 (U.S.) persons/square mile.

The population of the United States increased by 13.3 percent from 2000 to 2014. The populations of Pennsylvania and New Jersey increased by about a third (4.1 percent) and less than half (6.2 percent) this amount over the same period, respectively (table 4.8.1-1). Population change over this period in the four Pennsylvania counties ranged from a decrease of 0.1 percent (Luzerne County) to an increase of 12.6 percent (Northampton County). In the New Jersey counties, population increased by 3.3 percent (Hunterdon County) and 5.9 percent (Mercer County) from 2000 to 2014 (table 4.8.1-1).

TABLE 4.8.1-1 Population by State and County				
State/County a/	**Total Population**		**Percent Change (2000-2014)**	**Population Density in 2014 (persons per square mile)**
	2000	**2014**		
Pennsylvania	**12,281,054**	**12,787,209**	**4.1**	**286**
Luzerne	319,250	318,829	-0.1	358
Carbon	58,802	64,441	9.6	169
Northampton	267,066	300,654	12.6	813
Bucks	597,635	626,685	4.9	1,037
New Jersey	**8,414,350**	**8,938,175**	**6.2**	**1,215**
Hunterdon	121,989	126,067	3.3	295
Mercer	350,761	371,537	5.9	1,655
Project Area Counties	**1,715,503**	**1,808,213**	**5.4**	**624**
United States	**281,421,906**	**318,857,056**	**13.3**	**90**

Note:
a/ Counties are ordered from north to south along the Project
Source: U.S. Census Bureau 2000, 2010, 2015a

PennEast estimates that construction of the pipeline and associated facilities, including right-of-way restoration, would take 13 months (figure 4.8-1).[18] Construction is expected to be distributed over four spreads, each employing the same workforce and schedule. Employment by spread is estimated to range from a low of 18 workers at the end of the Project to a peak of 600 workers between weeks 23 to 30. Peak employment would occur at the same time for all four spreads with total Project employment of 2,400. Average employment for the duration of each spread would be 243 workers.

PennEast estimates that local workers would account for approximately 40 percent of construction jobs for each spread for the duration of the Project. The remaining 60 percent of the construction workforce would consist of non-local workers. Local workers are defined here as those who normally reside within daily commuting distance of the work sites. Non-local workers would temporarily relocate to the Project vicinity for the duration of their employment; some workers would possibly commute home on weekends, depending on the location of their primary residence. Individual non-local workers may also relocate along the length of the Project and between segments depending on their assignment. Very few, if any, of the non-local workers employed during the construction phase of each spread would be expected to be accompanied by family members or permanently relocate to the Project area.

[18] The overall 13 month construction period includes a four week period in December and January when no construction activities would be expected to occur (figure 4.8-1).

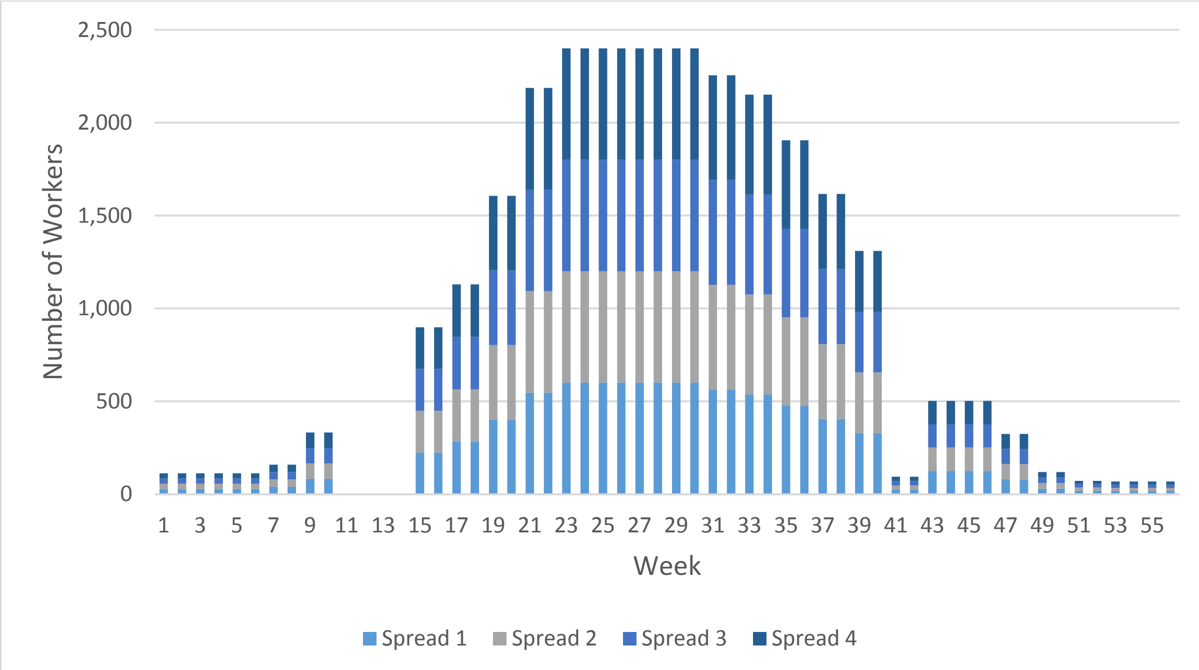

Figure 4.8-1 Estimated Construction Workforce by Spread and Week

Table 4.8.1-2 compares the projected average and peak numbers of non-local workers with existing county population by construction spread. These estimates illustrate the numbers of non-local workers estimated during construction. Non-local workers seeking temporary accommodation would reside in daily commuting distance of their work sites. Some non-local workers would likely reside in the counties within which they are working; others may locate in other communities in adjacent or nearby communities. Viewed as a share of total population in 2014, the peak number of workers expected to temporarily relocate by construction spread would be up to 0.1 percent of the existing populations (table 4.8.1-2). These temporary additions would be distributed along the length of the pipeline and would have no permanent impact on local populations.

TABLE 4.8.1-2

Projected Non-Local Workers by Construction Spread

Spread	State	County	2014 Population a/	Average Employment: Number of Non-Local Workers b/	Average Employment: Percent of 2014 Population	Peak Employment: Number of Non-Local Workers b	Peak Employment: Percent of 2014 Population
1	Pennsylvania	Luzerne	318,829	146	0.0%	360	0.1%
2	Pennsylvania	Luzerne, Carbon	383,270	146	0.0%	360	0.1%
3	Pennsylvania	Carbon, Northampton, Bucks	991,780	146	0.0%	360	0.0%
4	New Jersey	Hunterdon, Mercer	497,604	146	0.0%	360	0.1%

Notes:
a/ Existing population data are estimates prepared by the U.S. Census Bureau 2015a. These estimates are presented by county in table 4.8.1-1.
b/ Non-local workers are those who normally live outside daily commuting distance of the work sites. Non-local workers are assumed to comprise 60 percent of the total estimated workforce for each Project component.

An estimated 24 new permanent employees would be hired to directly support the operation phase of the Project. The addition of 24 workers and their families would not affect local population even if all of these workers were to relocate from elsewhere to the Project area.

4.8.2 Economy and Employment

4.8.2.1 Employment and the Economy

Summary economic information for 2014 is presented in table 4.8.2-1. Statewide annual unemployment rates in Pennsylvania (5.8 percent) and New Jersey (6.6 percent) were broadly comparable to the U.S. average (6.2 percent) in 2014. Annual unemployment rates in the four Pennsylvania counties in 2014 ranged from 5.2 percent (Bucks County) to 7.3 percent (Luzerne County). Annual unemployment rates in the New Jersey counties in 2014 were below the corresponding state average: 4.7 percent (Hunterdon County) and 5.7 percent (Mercer County) (table 4.8.2-1).

Statewide per capita income in 2014 exceeded the national per capita in both Pennsylvania (1.04 times the national per capita) and New Jersey (1.25 times the national per capita). Per capita income was lower than the corresponding state and national per capita amounts in three of the four Pennsylvania counties (Luzerne, Carbon, and Northampton counties), with per capita income above the state and national amounts in the other county (Bucks County). Per capita income was higher than the New Jersey state per capita in both Hunterdon and Mercer counties (table 4.8.2-1).

Based on data compiled for 2014 by the U.S. Bureau of Economic Analysis (2015a), the top three economic sectors in the United States by employment in 2014 were: government and government services; health care and social assistance; and retail trade. These three sectors were also the major employers statewide in Pennsylvania and New Jersey, as well as in three of the affected counties in Pennsylvania. The major employers in the other three counties (one in Pennsylvania, two in New Jersey) included the professional, scientific, and technical services sector, along with two of the other three sectors that dominated national and statewide totals (table 4.8.2-1).

TABLE 4.8.2-1

Economic Characteristics, 2014

State/County	Civilian Labor Force a/	Unemploy-ment Rate (Percent) a/	Per Capita Income a/	Percent of State/US Per Capita b/	Top Economic Sectors by Employment c/
Pennsylvania	**6,378,000**	**5.8**	**47,679**	**104**	**Health Care (14.1%), Government (10.6%), Retail Trade (10.5%)**
Luzerne	158,634	7.3	39,760	83	Health Care (13.7%), Retail Trade (11.9%), Professional Services (8.0%)
Carbon	31,712	7.0	38,866	82	Health Care (15.2%), Retail Trade (11.8%), Government (11.1%)
Northampton	154,841	5.9	45,299	95	Health Care (14.3%), Retail Trade (11.7%), Government (10.5%)
Bucks	335,628	5.2	62,514	131	Retail Trade (11.1%), Government (11.1%), Health Care (10.5%)

TABLE 4.8.2-1 Economic Characteristics, 2014					
State/County	Civilian Labor Force a/	Unemploy-ment Rate (Percent) a/	Per Capita Income a/	Percent of State/US Per Capita b/	Top Economic Sectors by Employment c/
New Jersey	**4,519,000**	**6.6**	**57,620**	**125**	**Government (12.0%), Health Care (11.9%), Retail Trade (10.4%)**
Hunterdon	66,365	4.7	77,944	135	Retail Trade (11.4%), Professional Services (11.4%), Government (11.3%)
Mercer	194,539	5.7	59,875	104	Government (15.7%), Professional Services (12.0%), Health Care (11.4%)
United States	**155,922,000**	**6.2**	**46,049**	**100**	**Government (12.9%), Health Care (11.2%), Retail Trade (10.1%)**

Notes:
a/ Civilian labor force, unemployment rate, and per capita income are annual average figures for 2014.
b/ County per capita income is shown as a percent of the corresponding state average; state figures are shown as a percent of the national average.
c/ Top industries by employment are identified from annual data compiled for 2014 by the U.S. Bureau of Economic Analysis. The full names of the identified sectors are: government and government services; health care and social assistance; retail trade; and professional, scientific, and technical services.
Source: U.S. Bureau of Economic Analysis 2015a, 2015b; U.S. Bureau of Labor Statistics 2015a, 2015b

Econsult Solutions and Drexel University (Econsult 2015) prepared an economic impact analysis of the Project on behalf of PennEast. PennEast estimates that it would spend $890 million on design and construction in the six counties that would be crossed by the Project, with an additional $300 million spent elsewhere. These expenditures would generate economic activity and support employment and income elsewhere in the economy through the multiplier effect, as initial changes in demand “ripple” through the local economy and support indirect and induced impacts. Indirect and induced impacts may be defined as follows:

- *Indirect* impacts are generated by the expenditures on goods and services by suppliers who provide goods and services to the construction project. Indirect effects are often referred to as “supply-chain” impacts because they involve interactions among businesses; and
- *Induced* impacts are generated by the spending of households associated either directly or indirectly with the proposed project. Workers employed during construction, for example, use their income to purchase groceries and other household goods and services. Workers at businesses that supply the facility during construction or operation do the same. Induced effects are sometimes referred to as “consumption-driven” impacts.

Econsult (2015) developed estimates of total (direct, indirect, and induced) economic impact for a six county region (those counties that would be crossed by the Project), the Commonwealth of Pennsylvania, and the State of New Jersey. These estimates were developed using separate IMPLAN models for each geographic area and were based on projected spending. According to Econsult (2015), Project design and construction would generate approximately $1.44 billion in total (direct, indirect, and induced) economic output in the six county region, supporting 11,210 total jobs and $695 million in total labor income (table 4.8.2-2). Combining their results for Pennsylvania and New Jersey, Econsult (2015) estimate that the Project would generate approximately $1.62 billion in total (direct, indirect, and induced) economic output in the two states, supporting 12,160 total jobs and $740 million in total labor income (table 4.8.2-2). These estimates are one-time economic impacts that would be generated during the 13 month construction period.

TABLE 4.8.2-2

Estimated Economic Impacts of Design and Construction

Impact a/	Six-County Region b/	Pennsylvania	New Jersey	Total Pennsylvania and New Jersey c/
Direct Output	$890	$670	$220	$890
Indirect and Induced Output	$550	$520	$210	$730
Total Output	**$1,440**	**$1,190**	**$430**	**$1,620**
Total Employment (Jobs) d/	**11,210**	**9,290**	**2,870**	**12,160**
Total Labor Income d/	**$695**	**$540**	**$200**	**$740**

Notes:
a/ Monetary impacts are expressed in millions of dollars.
b/ Impacts are assessed for a six-county model developed by Econsult (2015) using IMPLAN. The modeled region consists of the six counties that would be crossed by the Project: Luzerne, Carbon, Northampton, and Bucks counties, Pennsylvania; and Hunterdon and Mercer counties, New Jersey.
c/ The totals for Pennsylvania and New Jersey combined were estimated by adding the results from the separate IMPLAN models used to estimate total impacts for each state.
d/ Total employment and income estimates presented here include direct, indirect, and induced impacts.

Econsult (2015) also developed estimates of annual economic impacts based on expected annual expenditures on operation and maintenance. Annual operations and maintenance expenditures are expected to include maintenance surveys and inspections and the purchase of materials to support daily operation of the Project. The majority of these expenditures are expected to occur in the four Pennsylvania counties that would be crossed by the Project (Luzerne, Carbon, Northampton, and Bucks counties). According to Econsult (2015), Project operation would generate approximately $20.3 million in total (direct, indirect, and induced) economic output in the six county region, supporting 80 total jobs and $6.4 million in total labor income (table 4.8.2-3). Combining their results for Pennsylvania and New Jersey, Econsult (2015) estimate that operation of the Project would generate approximately $23.0 million in total (direct, indirect, and induced) economic output in the two states, supporting 98 total jobs and $8.3 million in total labor income (table 4.8.2-3). These are annual impacts that would occur over the life of the Project.

Several potential natural gas consumers, including Elizabeth Gas, South Jersey Gas Company, PSEG Energy Resources & Trade, and Enerplus, expressed their support for the PennEast Project during public scoping, some noting that the Project would provide greater natural supply reliability and flexibility, reduce price volatility, and result in significant gas cost savings. Support for the Project was also expressed by labor unions, including the United Association of Journeymen and Apprentices of the Plumbing and Piping Industry, Laborer's International Union of North America, and the International Union of Operating Engineers, Local 825. Local chambers of commerce also indicated their support for the Project during public scoping, noting the benefits of improved natural gas supply and the short-term economic benefits of Project construction.

TABLE 4.8.2-3 Estimated Annual Economic Impacts of Operation				
Impact a/	**Six-County Region b/**	**Pennsylvania**	**New Jersey**	**Total Pennsylvania and New Jersey c/**
Direct Output	$13.2	$12.6	$0.6	$13.2
Indirect and Induced Output	$7.1	$8.3	$1.5	$9.8
Total Output	**$20.3**	**$20.9**	**$2.1**	**$23.0**
Total Employment (Jobs) d/	**80**	**88**	**10**	**98**
Total Labor Income d/	**$6.4**	**$7.5**	**$0.8**	**$8.3**

Notes:
a/ Monetary impacts are expressed in millions of dollars.
b/ Impacts are assessed for a six-county model developed by Econsult (2015) using IMPLAN. The modeled region consists of the six counties that would be crossed by the Project: Luzerne, Carbon, Northampton, and Bucks counties, Pennsylvania; and Hunterdon and Mercer counties, New Jersey.
c/ The totals for Pennsylvania and New Jersey combined were estimated by adding the results from the separate IMPLAN models used to estimate total impacts from each state.
d/ Total employment and income estimates presented here include direct, indirect, and induced impacts. The report prepared by Econsult (2015) did not disaggregate these totals.

4.8.2.2 Recreation and Tourism

Recreation and tourism is not classified or measured as a standard industrial category and employment and income data are not specifically collected for this sector. Components of recreation and tourism activities are instead captured in other industrial sectors, primarily the retail sales and services sectors. Estimates of visitor spending and tourism-related employment, labor income, and associated state and local tax revenues prepared on behalf of Pennsylvania and New Jersey are summarized for 2013 in table 4.8.2-4. The tourism-related impacts presented in table 4.8.2-4 are total (direct, indirect, and induced) impacts. Statewide, estimated total (direct, indirect, and induced) tourism-related employment accounted for about 6.5 percent of total employment in Pennsylvania and 11.6 percent of total employment in New Jersey. Viewed by county, estimated total tourism-related employment as a share of total employment ranged from 6.1 percent in Luzerne County, Pennsylvania to 15.8 percent in Carbon County, Pennsylvania (table 4.8.2-4). In addition to recreation and tourism-related expenditures, natural landscapes and recreation resources also contribute to the quality of life of existing residents and can serve to attract new residents, businesses, and other sources of income to a region.

Public and private recreation resources in the vicinity of the Project are identified in section 4.7 of this EIS. Section 4.7 also assesses the potential for these resources to be negatively affected by construction and operation of the Project. PennEast has consulted with local public land management agencies to identify specific concerns and develop mitigation measures designed to minimize potential impacts, including impacts on visitors. These measures are site-specific, but generally include the use of buffers around construction zones and the use of specialized techniques to restore affected areas following construction. PennEast has also identified public parks, campgrounds, golf courses, and other recreational facilities within 0.25 mile of the Project, including three areas that would be crossed by the Project.

TABLE 4.8.2-4 Tourism-Related Economic Impacts by County and State					
County a/	Visitor Spending ($ million)	Tourism Employment (Jobs) a/	Percent of Total Employment b/	Labor Income ($ million) a/ c/	State and Local Taxes ($ million) a/
Pennsylvania	**39,223.0**	**478,888**	**6.5**	**18,762.8**	**4,132.6**
Luzerne	859.6	10,785	6.1	386.1	86.1
Carbon	354.4	3,980	15.8	120.1	31.6
Northampton	864.0	9,999	7.2	443.0	94.2
Bucks	741.8	15,329	4.2	564.7	90.5
New Jersey	**38,369.6**	**511,777**	**11.6**	**21,010.0**	**4,603.0**
Hunterdon	288.4	4,896	7.5	201.0	40.5
Mercer	1,154.3	21,801	9.8	895.0	151.8

Notes:
a/ Tourism-related employment, labor income, and state and local tax estimates are total economic impacts and include direct, indirect, and induced impacts.
b/ Total (direct, indirect, and induced) tourism-related employment as a share of total employment by geographic area. Statewide estimates for Pennsylvania and New Jersey, as well as for Hunterdon and Mercer counties were developed by Tourism Economics. Estimates for the Pennsylvania counties compare total tourism-related employment with the corresponding annual estimates of total employment compiled by the U.S. Bureau of Economic Analysis for 2013.
c/ Labor income estimates for Pennsylvania and New Jersey and the four Pennsylvania counties were developed by Tourism Economics. Estimates for Hunterdon and Mercer counties are based on the share of statewide tourism-related employment in those counties.
Source: Tourism Economics 2013a, 2013b; U.S. Bureau of Economic Analysis 2015c

While the potential exists for the Project to have localized effects on recreation resources, construction and operation of the Project would not be expected to substantially affect the recreation and tourism sector in the affected counties. Construction activities would be short-term and highly localized, with potential impacts reduced by proposed mitigation, including co-location with existing utilities in sensitive areas, the use of buffers during construction, and the use of specialized restoration techniques following construction. Impacts on specific areas and associated mitigation measures are discussed in more detail in section 4.7 of this EIS.

Specific concern has been raised with respect to the Pocono Raceway, located in Monroe County on the border with Carbon County, less than 5 miles from the Project. Pocono Raceway is a motor racing track that hosts NASCAR and other motor racing events. PennEast states that it is coordinating with the Pocono Mountain Visitor's Bureau and has agreed to halt construction efforts and avoid the use of roadways during weekends when there is a high-traffic event planned at the Pocono Raceway.

4.8.2.3 Agriculture

Land in farms accounted for 18 percent (328,000 acres) of the total land area in the counties that would be crossed by the Project, with a total of 3,795 farms and an average farm size of 86 acres (table 4.8.2-5). Land in farms accounted for 27 percent of the total land area in Pennsylvania in 2012 and 15 percent of total land area in New Jersey (table 4.8.2-5). Statewide, livestock, poultry, and their products accounted for the majority (62 percent) of agricultural products sold by market value in Pennsylvania. Crops accounted for the majority of agricultural products sold in New Jersey and all the counties crossed.

Viewed by county, land in farms ranged from 9 percent of total land area in Carbon County, Pennsylvania to 35 percent in Hunterdon County, New Jersey (table 4.8.2-5). Hunterdon County had a relatively high concentration of employment in the farm sector in 2014, with farm jobs accounting for 2.1 percent of total employment compared to the New Jersey statewide average of 0.3 percent (U.S. Bureau of Economic Analysis 2015a).

TABLE 4.8.2-5

Summary of Agriculture by County and State, 2012

County/State	Number of Farms	Land in Farms (acres)	Percent of Total Land Area	Average Farm Size (acres)	Market Value of Agriculture Products Sold		
					Total ($ million)	Crops (Percent of Total)	Livestock, Poultry, and Products (Percent of Total)
Pennsylvania	**59,309**	**7,704,444**	**27%**	**130**	**$7,704.4**	**38%**	**62%**
Luzerne	556	60,930	11%	110	$21.0	82%	18%
Carbon	195	21,162	9%	109	$9.3	91%	9%
Northampton	498	65,744	28%	132	$43.5	83%	17%
Bucks	827	64,024	17%	77	$62.4	75%	25%
New Jersey	**9,071**	**715,057**	**15%**	**79**	**$1,006.9**	**88%**	**12%**
Hunterdon	1,447	96,025	35%	66	$67.2	85%	15%
Mercer	272	19,744	14%	73	$19.7	83%	17%
County Total a/	**3,795**	**327,629**	**18%**	**86**	**$223.2**	**82%**	**18%**

Note:
a/ County total represents the combined totals for the six counties that would be crossed by the Project.
Source: U.S. Department of Agriculture 2014, U.S. Census Bureau 2010

Impacts on agricultural land are discussed in section 4.7 of this EIS and include potential impacts on livestock grazing, crop production, agricultural drainage and irrigation systems, farmland preservation programs, and certified organic farms. The estimated disturbance to agricultural operations during construction and operation would be 573 acres and 204 acres, respectively, with 6 acres of agricultural land permanently impacted at aboveground facility sites. These totals represent a very small share of the 328,000 acres of land in farms in the six affected counties and are unlikely to noticeably affect overall agricultural production and employment in any of the affected counties. PennEast would negotiate with and reimburse landowners/producers of products for damages or loss of use and resources as a result of the construction of the Project. Crop production could continue on the pipeline easement after construction in areas of agricultural production, except where aboveground facilities would be located. Trees, including orchard trees, would likely not be allowed on the permanent easement.

Public concern has been expressed that construction and operation of the Project could result in organic farmers losing organic certification. Based on a review of various databases and publicly available information, PennEast identified one certified organic farm adjacent to the proposed pipeline. PennEast proposes to avoid impacts on this farm by using HDD technology to drill under forested lands located adjacent to the farm, and locating the associated bore pits more than 1,500 feet from the property boundary. No other organic farms were identified in the immediate vicinity of the Project. Potential impacts on organic farms are discussed further in section 4.7 of this EIS.

4.8.3 Housing

Housing resources are summarized by county and state in table 4.8.3-1. Data on housing units are estimates for 2014 prepared by the U.S. Census Bureau (2015b, 2015c). The Census Bureau defines a housing unit as a house, apartment, mobile home or trailer, group of rooms, or single room occupied or intended to be occupied as separate living quarters. Viewed by county, these estimates indicate that available rental housing units range from about 200 in Carbon County, Pennsylvania to approximately 4,400 units in Bucks County, Pennsylvania (table 4.8.3-1). In addition to these resources, the Project area counties include numerous housing units for seasonal, recreational, or occasional use (table 4.8.3-1).

Data on hotels and motels are also presented by affected county in table 4.8.3-1. These data, compiled by STR, a travel research firm, are for hotels, motels, and bed and breakfast inns with 15 or more rooms. These data suggest there is relatively limited hotel and motel accommodation available in Carbon and Hunterdon counties, with eight and nine hotels/motels identified, respectively. More extensive hotel/motel resources are available in the other four counties that would be crossed by the Project (table 4.8.3-1). Temporary accommodation is also available in the form of recreational vehicle (RV) and other types of campsites in the Project vicinity. Comprehensive data are not available for these types of resources, but information compiled by PennEast suggests that RV facilities are located within commuting distance of the pipeline route (table 4.8.3-1).

TABLE 4.8.3-1

Housing by State and County, 2014

County/State	Housing Units 2014				Hotels and Motels		Campgrounds and RV Parks
	Total Housing Units	Rental Vacancy Rate	Units Available for Rent	For Seasonal, Recreational, or Occasional Use a/	Number of Facilities	Number of Rooms	Number of Facilities
Pennsylvania	**5,578,393**	**6.0**	**98,736**	**172,037**	**1,420**	**135,778**	**NA**
Luzerne	148,551	4.3	1,896	3,191	47	3,837	9
Carbon	34,374	3.2	183	5,880	8	770	4
Northampton	120,787	5.2	1,720	1,117	20	2,023	4
Bucks	246,231	7.5	4,352	1,720	55	4,446	8
New Jersey	**3,572,138**	**6.5**	**77,830**	**132,780**	**1,030**	**103,520**	**NA**
Hunterdon	49,612	6.3	521	350	9	731	5
Mercer	144,069	7.4	3,728	704	37	4,521	0

Notes:
NA – Data were not compiled for campgrounds and RV parks at the state level.
a/ Housing units for seasonal, recreational, or occasional use are generally considered to be vacation homes. They are not included in the estimated number of housing units available for rent.
Source: STR 2015; U.S. Census Bureau 2015b, 2015c

The availability of temporary housing varies seasonally and geographically within the counties that would be crossed by the Project. Demand for temporary housing is generally greatest during the tourism season in the summer months. Data compiled by STR and provided to PennEast identified annual hotel/motel vacancy rates by county ranging from 53 percent for Hunterdon County, New Jersey to 67 percent for Northampton County, Pennsylvania (table 4.8.3-2). (Occupancy data are not compiled for Carbon County, Pennsylvania). Occupancy rates peaked during the summer in all five counties where occupancy data are available, with the peak occurring in August in four of the five counties. Seasonal lows occurred in January for all five counties and it is reasonable to assume that trends would be similar in the hotels/motels in Carbon County (table 4.8.3-2).

TABLE 4.8.3-2

Motel/Hotel Occupancy Rates by County (Percent)

County a/	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Annual Total
Pennsylvania													
Luzerne	42	49	53	63	61	64	68	69	62	63	51	43	57
Northampton	53	63	61	69	71	75	76	79	69	73	68	58	67
Bucks	47	53	57	60	65	72	72	73	61	63	59	47	60
New Jersey													
Hunterdon	37	42	46	51	56	64	63	62	60	60	55	44	53
Mercer	45	51	54	61	66	71	67	65	60	65	59	44	59

Note:
a/ Occupancy rate information is not available for Carbon County, Pennsylvania.
Source: STR 2015

Table 4.8.3-3 presents average and peak numbers of non-local workers by construction spread, as well as estimates of available rental housing, hotel and motel rooms, and campground and RV facilities. These estimates illustrate the numbers of non-local workers expected to be present during construction. Non-local workers seeking temporary accommodation would reside in daily commuting distance of their work sites. Some non-local workers would likely reside in the counties within which they are working; others may locate in other communities in adjacent or nearby communities.

The data presented in table 4.8.3-3 indicate that sufficient housing resources should be available to accommodate peak housing demand during construction. Peak demand for housing would, for example, range from 6 percent (spread 3) to 10 percent (spread 1) of available hotel and motel rooms. Peak demand for housing would generally coincide with peak occupancy for hotels and motels in the affected counties. Peak hotel and motel occupancy rates in the affected counties range from 64 percent (Hunterdon County, New Jersey) to 79 percent (Northampton County, Pennsylvania) (table 4.8.3-2). Based on this comparison, the number of available hotel and motel rooms would be sufficient to accommodate the entire peak construction-related demand. Similarly, the number of housing units available for rent also exceeds the entire peak construction demand for all four spreads. As a result, construction crews should not encounter difficulty in finding temporary housing, and Project construction should not significantly impact the availability of housing for non-Project-related needs.

TABLE 4.8.3-3

Estimated Construction-Related Housing Demand by Construction Spread

Spread	State	County	Estimated Housing Demand a/		Estimated Available Housing Resources b/		
			Average Employment (Workers/ Month)	Peak Employment (Workers/ Month)	Housing Units Available for Rent	Hotel and Motel Rooms	Camp-ground and RV Facilities
1	Pennsylvania	Luzerne	146	360	1,896	3,837	9
2	Pennsylvania	Luzerne, Carbon	146	360	2,079	4,607	13
3	Pennsylvania	Carbon, Northampton, Bucks	146	360	6,255	7,239	16
4	New Jersey	Hunterdon, Mercer	146	360	4,249	5,252	5

Notes:
a/ An estimated 60 percent of the total construction workforce is assumed to be non-local for the duration of the Project.
b/ Housing data are presented by county in table 4.8.3-1. Data are only presented for counties that would be directly crossed.

The Project would employ an estimated 24 new permanent employees to directly support the operation phase of the Project. The addition of 24 households would have a negligible effect on the demand for local housing resources even if all of these workers were to relocate from elsewhere to the Project area.

4.8.4 Public Services

Summary data for law enforcement and fire departments are presented by affected county in table 4.8.4-1. These data provide a general overview of resources available in each county. In general, the number of police and fire departments is directly related to the overall size and population of the county, as well as the number of communities. Multiple law enforcement agencies and providers exist in the potentially affected counties, including state patrol, county sheriffs, and local police departments. PennEast identified a total of 150 law enforcement agencies in the six counties that would be crossed by the Project, with 11 of these agencies located within one mile of the Project. Multiple fire departments and districts provide fire protection and suppression services in the affected counties. Many of these fire departments and districts are at least partially staffed by volunteers. PennEast identified a total of 79 fire and rescue units in the six Project area counties, with 21 of these units located within one mile of the Project.

Medical facilities in the counties crossed by the proposed pipeline are identified in table 4.8.4-1. Minor Project-related injuries would be treated at local medical facilities or emergency rooms. Workers with more serious injuries would be transported to one of the larger hospitals in the general vicinity. The number of school districts, schools, and students are also summarized by county in table 4.8.4-1.

TABLE 4.8.4-1 Public Services by County							
County	**Law Enforcement Agencies**	**Fire and Rescue Units**	**Total Hospitals**	**Number of Hospital Beds**	**Number of School Districts a/**	**Number of Schools a/**	**Number of Students a/**
Pennsylvania							
Luzerne	43	23	8	1,086	17	69	45,155
Carbon	14	5	2	155	7	22	9,063
Northampton	25	11	3	285	14	65	45,768
Bucks	41	19	9	1,197	20	134	89,136
New Jersey							
Hunterdon	14	16	1	184	26	46	20,081
Mercer	13	5	7	1,091	20	195	57,769

Note:
a/ Source: National Education Association Research 2014

The temporary addition of construction workers to local communities would not be expected to affect the levels of service provided by existing law enforcement and fire protection personnel. Increased demands for local services that could occur from construction workers temporarily relocating to the affected areas would be short term. Construction of the pipeline could result in increased demand for emergency services. Local police assistance would likely be required to facilitate traffic flows during construction at some road crossings and permits could be required for vehicle load and width limits for some of the vehicles delivering Project materials and supplies.

PennEast has indicated that it would work with local law enforcement, fire departments, and emergency medical services to coordinate for effective emergency response. Local emergency response and management personnel would receive emergency response training prior to the Project being placed into service and on an ongoing basis thereafter. Necessary information and instructions regarding the facilities would be provided to local emergency response and management personnel. In addition, in accordance with 49 CFR 192.615, PennEast would prepare an Emergency Response Plan that would identify the coordination between PennEast and local emergency response and management personnel that would occur in the event of an incident.

Construction of the Project would not be expected to have significant adverse impacts on local and regional medical facilities and services. The temporary relocation of workers to the counties along the pipeline route would not be expected to affect existing levels of health care and medical services. Minor increases in demands for local services that could occur from workers temporarily relocating to the area would be short term.

Very few, if any, of the non-local workers employed during the construction phase of each spread would be expected to be accompanied by family members. As a result, the number of school age children expected to relocate would be very limited and unlikely to noticeably affect school enrollment in the Project area.

Operation and maintenance of the Project would be expected to have minimal impacts on public services because only a limited number of new permanent employees would be required, with an estimated 24 new permanent employees expected to be hired to directly support the operation phase of the Project. The addition of 24 workers and their families would be unlikely to affect demand for public services even if all of these workers were to relocate from elsewhere to the Project area.

PennEast has established a Community Connector Grant Program in conjunction with the development of the Project. Grants of up to $5,000 have been awarded to support projects in communities along the proposed route. The program provides support for first responders and emergency management, improved community safety, conservation of important habitat, enhancement of open spaces, recreational areas, and wildlife habitat, preservation of community culture and heritage, support for environmental or energy education programs, and support for local workforce development for the energy industry. As of September 2015, the Community Connector Grant Program had reportedly invested $240,000 in Pennsylvania and New Jersey communities. Projects supported by this effort have to date included new fire engines and rescue equipment, a playground installation, a farm-to-table project, new personal protective equipment for fire companies, and improvements to an evacuation shelter.

4.8.5 Public Utilities and Related Infrastructure

The pipeline would cross a number of buried utilities and roadways that include existing buried utilities such as sewer and water lines within the road easement. Prior to construction, PennEast would identify and locate existing utility lines and other sensitive resources identified in easement agreements or by federal and state agencies to prevent accidental damage during construction. PennEast continues to have ongoing dialogue with the utility companies where the Project is proposing to co-locate with respect to access, set-back distances required from their facilities, and areas of their existing right-of-ways that can be used for staging, laydown, stockpiling of soils, and related construction activities. In addition to any agreements with the utilities, PennEast would continue to work with, and obtain consent from individual landowners directly affected by the Project.

PennEast's contractors would contact the "Call Before You Dig" number, 811, prior to construction to verify and mark all utilities along the Project workspace areas to minimize the potential for damage to other buried facilities in the area. If there is a question about the location of a utility, such as a water, cable, gas, or sewer line, PennEast would verify the vertical and horizontal location of the existing infrastructure using field instrumentation and test pits prior to installation of the pipeline. Where the proposed pipeline crosses under an existing utility line, the utility line would be temporarily supported as required. After the pipeline is installed, the backfill would be compacted properly to prevent settling.

If concerns are raised regarding utility damage, a post construction inspection would be performed to clarify damages. PennEast would be responsible for the repair/replacement of any damaged existing sewer or water infrastructure to the satisfaction of the city/utility owner and to ensure the impacts on residences or businesses as a result of any such damage are minimized. PennEast would comply with appropriate federal, state, and local requirements intended to protect existing utilities that are crossed by the pipeline, which is consistent with the terms and conditions of the FERC Certificate if the Project is approved. These measures would minimize potential impacts on water, sewer, and other utilities. Specific details regarding individual crossings would be provided by PennEast to the appropriate municipal permitting agencies prior to construction.

No impacts on existing utilities and related infrastructure are anticipated during operation of the proposed facilities and only short-term, temporary impacts would result from construction activities.

Public comments received on the Project include concerns that construction would have detrimental effects on groundwater resources and private and municipal water supplies. These issues are discussed in section 4.3 of this EIS.

4.8.6 Transportation and Traffic

The local road and highway system in the vicinity of the Project is readily accessible by interstate highways, U.S. highways, state highways, secondary state highways, county roads, and private roads. Interstate-81 (I-81), I-476, and I-78 provide access to the Project vicinity. State Routes 33 and 22 in Pennsylvania and State Route 29 in New Jersey also provide general access to the Project vicinity. The Project may temporarily impact transportation and traffic during construction across roadways and railroads. Increases in traffic volumes associated with construction workers commuting to and from job sites, deliveries of equipment and materials to the Project, and the movement of construction equipment may also affect transportation and traffic.

To the extent practicable, existing public and private road crossings along the Project route would be used as the primary means of accessing rights-of-ways. In addition to the existing access available by the use of public roads, PennEast has identified an additional 121 access roads for use during Project construction, with a total combined length of approximately 32.6 miles. The 121 identified access roads consist of 64 existing roads, 40 partially existing roads, and 17 new access roads that would be constructed as part of the Project. The majority of these access roads (88 roads) are located in Pennsylvania, with the remaining 33 access roads located in New Jersey (see section 2.2.3).

Appendix G-1 provides the milepost as well as the crossing method for each of the road and railroad crossings associated with the Project. Road and railroad crossings and Project-related traffic are discussed in more detail below.

4.8.6.1 Roadway and Railroad Crossings

The Project would require 189 public road crossings and one railroad crossing (see appendix G-1). These crossings would be accomplished using conventional boring, HDD, or open-cut techniques. A summary of each of these crossing techniques is provided in section 2.3.1.2. The use of boring or HDD techniques would avoid road surface impacts from excavating a pipeline trench; the use of the open-cut crossing method would not. Road crossing permits would be obtained from applicable federal, state, and local agencies. These permits would dictate the specific requirements for the day-to-day construction activities at each crossing, as well as post-construction restoration and repair requirements.

Major road crossings, including most high-volume state and local road crossings, would typically be accomplished using conventional boring techniques or HDD. These techniques would minimize or avoid entirely any disturbance to roadways and traffic patterns. The open-cut crossing method would primarily be used to cross driveways, parking lots, and roads with low traffic densities. The first step for an open-cut crossing would be to install traffic control devices. Traffic would be detoured around the open trench during the installation process. The pipeline crossing would be installed one lane at a time and, as the pipe is installed, successive lanes would alternately be taken out of service until the crossing is completed. Another option that could be used would be to temporarily close a portion of the road and detour traffic around the work area onto an adjacent roadway.

PennEast proposes to develop a Traffic Management Plan that would include a summary of roadways where Project construction would take place, existing and projected traffic flow information, and detailed information regarding traffic management strategies. The Traffic Management Plan would also include proposed mitigation measures for potential transportation-related impacts such as avoidance of peak traffic periods, detours, consultation and coordination with local authorities, signage, and public notification in newspapers. PennEast has indicated that this plan would be filed with FERC prior to issuance of the final EIS.

4.8.6.2 Project-related Traffic

In addition to the traffic impacts caused by road crossings, the temporary movement of construction equipment and materials and the daily commuting of employees to and from the construction work areas would add to existing traffic volumes on local roads. Construction activities would be spaced over four construction spreads, with each spread responsible for all construction activities within a specific milepost range along the pipeline. These activities would include surveying/staking the route, clearing and grading, trenching, pipe stringing, welding, lowering-in, hydrostatic testing, backfilling, regrading, and restoration (see section 2.3.1 of this EIS). Construction activities at each spread would typically proceed in sequence in an assembly-line fashion along the right-of-way, with one crew following the next from clearing until final clean-up. As a result, construction workers and equipment would not only be divided between four spreads, but would also typically be distributed at different locations within each spread.

4.8.7 Displacement of Residences and Businesses

Construction and operation of the Project would not be expected to result in the permanent displacement of businesses or residences. The proposed Project route has been designed to avoid or minimize direct impacts on residences.

4.8.8 Property Values and Insurance

4.8.8.1 Property Values

The impact a pipeline may have on the value of a tract of land depends on many factors, including the size of the tract, the values of adjacent properties, the presence of other utilities, the current value of the land, and the current land use. Subjective valuation is generally not considered in appraisals, but may affect individual decisions when a property is offered for sale, thus impacting the potential resale value. Purchase decisions are often based on the purchaser’s plans for the property, such as use for agriculture, future residential development, a second home, or commercial/industrial development. If the presence of a pipeline interferes with those future plans, the potential buyer may decide against acquiring the property with a pipeline easement. However, each potential purchaser has different criteria and differing capabilities to purchase land.

Public comments received on the Project included concerns about the potential impact of the pipeline on property values. The Interstate Natural Gas Association of America conducted a national case study to determine if the presence of a pipeline on a piece of property affected the property value or sales price of the property (Allen, Williford & Seale, Inc. 2001). The study employed paired sales, descriptive statistics, and linear regression analysis to assess impacts on four separate, geographically diverse case study areas. The study found that there was not a significant impact on the sales price of properties located along natural gas pipelines. They further determined that neither the size of the pipeline (diameter) nor the product carried by a pipeline had any significant impact on sales price. The study also concluded that the presence of a pipeline did not impede the development of surrounding properties.

More recent studies investigating property values near natural gas pipelines are consistent with the findings of this earlier work. Fruits (2008) evaluated the impact of the South Mist Pipeline Extension on residential sales in Clackamas and Washington counties, Oregon using a hedonic price modeling approach. Based on sales price data for 10,642 single family residential properties located within one mile of the pipeline, the study found that proximity to the pipeline had no statistically or economically significant impact on residential property values. Fruits (2008) noted that these results are consistent with previous studies and suggested that the positive amenity potential associated with pipeline proximity (i.e., the function of the pipeline easement as a greenbelt or buffer) may exceed any perceived costs associated with potential safety or environmental risks (Fruits 2008).

A 2008 study conducted by PGP Valuation on behalf of Palomar Gas Transmission LLC also assessed the impacts of the South Mist Pipeline Extension on property values (Palmer 2008). Using a sales comparison methodology, the study evaluated sales data for a total of 18 properties encumbered by South Mist Pipeline Extension right-of-way easements and compared these with sales of other comparable unencumbered properties. Based on this analysis, PGP Valuation concluded that high-pressure natural gas pipelines had no measurable long-term impact on property values. The study also concluded that variations in short-term values were either not substantial or non-existent and that residential properties were not impacted by the pipeline easement any more or less than other property types (Palmer 2008).

A third more recent study analyzed sales data from approximately 1,000 residential properties in Arizona to test whether proximity to a natural gas pipeline had an effect on real estate sales prices (Diskin et al. 2011). Using sales price information, the study compared sales prices for properties encumbered by or adjacent to a natural gas transmission pipeline with comparable properties not along a pipeline right-of-way. The study was unable to identify a systematic relationship between proximity to a pipeline and sales price or property value. The researchers cautioned that these results are limited to the dataset examined and should not be generalized to all geographic regions (Diskin et al. 2011).

Public comments received on the Project also included concerns that the Project would affect the ability of landowners to subdivide or develop their property in the future. PennEast has attempted to address these concerns by compiling a list of planned residential and commercial developments within 0.25 mile of the Project and working to avoid or minimize direct impacts on the identified projects. Approaches to avoiding or minimizing impacts include minor route variations, timing restrictions, or increased traffic control in areas where development is planned. PennEast has also indicated that affected landowners may present any subdivision plans or incurred expenses to PennEast who would take them into consideration when calculating easement compensation.

4.8.8.2 Insurance

Concerns have been expressed that the presence of a pipeline easement could result in increased insurance rates for residential properties. Insurance advisors consulted on other natural gas projects reviewed by the FERC indicated that natural gas pipelines are not an issue during the insurance underwriting process and the presence of energy infrastructure, such as a pipeline, has not historically affected rates or eligibility for residential insurance applications (FERC 2008, 2014). As such, homeowners' insurance rates would be unlikely to change due to construction and operation of the proposed Project.

Similar to other projects and facilities of this type, PennEast would maintain insurance coverage for the Project from the start of the survey process through the lifetime of the Project, with coverage that would apply to qualifying claims from third-parties, including landowners.

4.8.9 Tax Revenues

Construction and operation of the Project would generate state and local tax revenues in the form of income tax and taxes on expenditures. Estimated state income taxes are presented for Pennsylvania and New Jersey in table 4.8.9-1. Estimates are presented for the construction and operation phases of the Project. These estimates developed by Econsult (2015) are based on their estimates of total labor income for each state (see tables 4.8.2-1 and 4.8.2-3) multiplied by the applicable state income tax rates. The construction estimates are one-time payments that would be generated during the 13 month construction period. Econsult (2015) estimates that construction of the Project would support an estimated $11.1 million in one-time income tax payments to the Commonwealth of Pennsylvania, and $6.4 million in payments to the State of New Jersey (table 4.8.9-1). The operation estimates are annual estimates that would occur for the life of the Project. Econsult (2015) estimates that operation of the Project would support approximately $154,000 each year in income tax payments to the Commonwealth of Pennsylvania, and $25,000 in payments to the State of New Jersey (table 4.8.9-1).

TABLE 4.8.9-1

Estimated State Income Tax during Project Construction and Operation ($000s)

State	Construction a/	Operation b/
Pennsylvania	11,100	154
New Jersey	6,400	25

Notes:
a/ Construction estimates are one-time payments that would be generated during the 13 month construction period. These estimates are based on estimates for total (direct, indirect, and induced) labor income that would be supported by the Project (see table 4.8.2-1) multiplied by the applicable state income tax rates.
b/ Operation estimates are annual payments that would be generated for the operating life of the Project. These estimates are based on estimates for total (direct, indirect, and induced) labor income that would be supported by the Project (see table 4.8.2-3) multiplied by the applicable state income tax rates.
Source: Econsult 2015

Project-related expenditures would also generate sales and use tax revenues during construction and operation of the Project. Sales and use tax rates in Pennsylvania and New Jersey are 6 percent and 7 percent, respectively (Pennsylvania Department of Revenue 2015a, New Jersey Division of Taxation 2014). Sales and use tax is generally imposed on the retail sale, consumption, rental, or use of tangible personal property in the state in question. In-state purchases of materials and equipment are subject to sales tax. Purchases of materials and equipment outside the affected state for use in that state are typically subject to use tax. These types of purchases would result in large one-time sales and use tax revenues during construction, with much smaller revenues generated each year during operation.

PennEast believes that it would be largely exempt from sales and use tax in Pennsylvania, and estimates that one-third of operation-related expenditures would be subject to sales and use tax in New Jersey. Estimated annual average state income tax and sales and use tax revenues based on operation of the Project over a 5-year period are presented by state in table 4.8.9-2. PennEast estimates that operation of the Project would support approximately $5.3 million in annual average state income tax revenues in Pennsylvania and $2.3 million in New Jersey. Operation would also support an estimated $6.3 million in annual sales and use tax revenues in New Jersey (table 4.8.9-2).

In addition to the state income tax estimates during operation as presented in table 4.8.9-2, PennEast estimates that Project operation over the same 5-year period would generate an annual average of $24.8 million in federal income tax revenues.

TABLE 4.8.9-2

Estimated State Income Tax and Sales and Use Tax Revenues during Operation by State

State	Estimated State Income Tax Revenues ($000s) a/	Estimated Sales and Use Tax Revenues ($000s) a/
Pennsylvania	$5,306.0	$0.0
New Jersey	$2,282.0	$6,345.4

Note:
a/ Annual average estimates developed by PennEast based on a 5-year operating period.

Operation of the Project would also generate property tax revenues or the equivalent in states and counties crossed. In Pennsylvania, entities providing utilities regulated by the Pennsylvania Public Utility Commission or a similar regulatory body are subject to the public utility realty tax (PURTA) in lieu of local real estate taxes, with the local realty tax equivalent distributed to local taxing authorities (Pennsylvania Department of Revenue 2015b). PennEast estimates that operation of the Project over a 5-year period would generate an annual average of $69,000 in PURTA payments to the Commonwealth of Pennsylvania.

In New Jersey, operation of the Project would generate annual property tax revenues in the townships crossed. Annual average estimates based on operation of the Project over a 5-year period are presented by affected township in table 4.8.9-3. Annual average estimates range from about $294,000 in Alexandria Township (Hunterdon County) to more than $1 million in Hopewell Township (Mercer County) (table 4.8.9-3).

TABLE 4.8.9-3 Estimated Property Tax Revenues during Operation in New Jersey	
County/Township	Estimated Property Tax Revenues ($000s) a/
Hunterdon County	
Holland	$867.7
Alexandria	$293.7
Kingwood	$610.3
Delaware	$583.0
West Amwell	$450.4
Mercer County	
Hopewell	$1,093.8

Note:
a/ Annual average estimates developed by PennEast based on a 5-year operating period.

4.8.10 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires each federal agency to make the achievement of environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. The Executive Order further stipulates that the agencies conduct their programs and activities in a manner that does not have the effect of excluding persons from participation in them, denying persons the benefits of them, or subjecting persons to discrimination because of their race, color, or national origin.

In accordance with Executive Order 12898, all public documents, notices, and meetings were made readily available to the public during FERC's review of the Project. In addition, PennEast hosted four open houses in the Project area in November 2014. Following revisions to the proposed alignment in March 2015, PennEast hosted additional invitation-only informational sessions for affected landowners in select areas where the route changed. PennEast has participated in more than 200 meetings with public officials and groups since the Project was announced in August 2014. PennEast has also established a Project website and a toll-free line to respond to questions about the Project, and has reportedly responded to more than 735 emails and 450 telephone enquiries, as well as awarding $240,000 to first responders and environmental programs under a Community Connector Grant Program launched in November 2014.

PennEast also used the FERC's pre-filing process (see section 1.4 of this EIS). One of the major goals of this process is to increase public awareness and encourage public input regarding every aspect of the Project before a formal application is filed with FERC. As part of this process, FERC staff hosted five scoping meetings in February 2015 to receive input from the public about the Project. The scoping meetings were held in Bethlehem, Jim Thorpe, and Wilkes-Barre, Pennsylvania and West Trenton and Hampton, New Jersey. Interested parties have had, and will be given, opportunities to participate in the NEPA review process. To date, this has included the opportunity to participate in the public scoping meetings within the Project area to identify concerns and issues that should be covered in the EIS, and the opportunity to submit written comments about the Project to the FERC. Stakeholders will have the opportunity to review this draft EIS, participate in public meetings to make comments on the draft EIS, and provide comments directly to the FERC staff in person or in writing.

4.8.10.1 Demographic and Economic Data

Identifying whether disproportionately high and adverse impacts on minority and/or low-income populations would occur typically involves two steps: first, identifying whether minority and/or low-income communities are present, and, then, if these types of communities are present, evaluating whether high and adverse human health or environmental effects would disproportionately affect the identified community or communities.

Guidelines provided by the White House CEQ (1997) and EPA (1998) indicate that a minority community may be defined as either: 1) where the minority population comprises more than 50 percent of the total population; or 2) where the minority population is meaningfully greater than the minority population in the general population of an appropriate benchmark region used for comparison. Minority communities may consist of a group of individuals living in geographic proximity to one another, or a geographically dispersed set of individuals who experience common conditions of environmental effect. Further, a minority population exists if there is "more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds" (CEQ 1997).

The CEQ and EPA guidelines indicate that low-income populations should be identified based on the annual statistical poverty thresholds established by the U.S. Census Bureau. Like minority populations, low-income communities may consist of individuals living in geographic proximity to one another, or a geographically dispersed set of individuals who would be similarly affected by the proposed action or program. The U.S. Census Bureau defines a poverty area as a census tract or other area where at least 20 percent of residents are below the poverty level (U.S. Census Bureau 2015d).

Race and Ethnicity

The populations of five of the six counties that would be crossed by the Project are primarily White, ranging from 80 percent of the population (Northampton County) to 93 percent (Carbon County). Persons identifying as White accounted for slightly more than half the population in the sixth county (Mercer County, New Jersey) (table 4.8.10-1). African American/Black was the largest minority group in Mercer County in 2014, accounting for 20 percent of the population.

The six counties that would be crossed by the Project range from approximately 225 square miles to 890 square miles in size (U.S. Census Bureau 2010). Larger and more populated geographic areas may have the effect of "masking" or "diluting" the presence of concentrations of minority and/or low-income populations (CEQ 1997; EPA 1998). Data on race and ethnicity were therefore also reviewed at the census block group level.[19] None of the census block groups that would be crossed in Pennsylvania or New Jersey had total minority populations that exceeded 50 percent, and, therefore, the population in these census blocks did not meet the definition of a

[19] A census block group is a statistical subdivision of a census tract, generally defined to contain between 600 and 3,000 people and 240 and 1,200 housing units.

minority community based on the 50 percent criteria identified by the CEQ (1997) and EPA (1998) guidelines.

TABLE 4.8.10-1

Race and Ethnicity/Poverty by Census Block Group, 2014

State/County/Block Group	Total Population	Percent of Total White a/	Hispa-nic Origin	African Ameri-can/ Black a/	Asian a/	Other Race a/ b/	Total Minority	Below Poverty
PENNSYLVANIA	**12,758,729**	**79**	**6**	**11**	**3**	**2**	**21**	**13.5**
Luzerne County	**320,392**	**87**	**8**	**3**	**1**	**1**	**13**	**16.3**
Block Group 4, Census Tract 2112.04	1,841	93	3	1	3	0	7	8.7
Block Group 1, Census Tract 2114	720	98	2	0	0	0	2	0.0
Block Group 6, Census Tract 2114	1,515	99	1	0	0	0	1	6.8
Block Group 2, Census Tract 2115	935	95	5	0	0	0	5	12.9
Block Group 3, Census Tract 2115	1,104	100	0	0	0	0	0	11.7
Block Group 3, Census Tract 2116	1,245	100	0	0	0	0	0	6.7
Block Group 3, Census Tract 2117.01	1,909	99	0	1	0	0	1	10.1
Block Group 1, Census Tract 2117.02	1,577	92	1	0	6	1	8	2.1
Block Group 1, Census Tract 2118	973	84	0	1	9	6	16	10.5
Block Group 1, Census Tract 2119	937	98	0	0	2	0	2	0.4
Block Group 2, Census Tract 2119	1,015	94	0	0	6	0	6	2.9
Block Group 3, Census Tract 2119	2,718	100	0	0	0	0	0	26.2
Block Group 2, Census Tract 2153	991	99	1	0	0	0	1	3.6
Block Group 4, Census Tract 2153	2,207	97	0	0	2	0	3	3.6
Carbon County	**64,874**	**93**	**4**	**1**	**0**	**1**	**7**	**11.1**
Block Group 1, Census Tract 201.05	3,346	81	5	6	3	5	19	2.3
Block Group 2, Census Tract 201.06	1,481	93	7	0	0	0	7	2.9
Block Group 1, Census Tract 208	1,558	99	1	0	0	0	1	3.0
Block Group 2, Census Tract 208	2,904	98	2	0	0	0	2	5.9
Block Group 3, Census Tract 208	1,121	95	2	0	3	0	5	21.2
Block Group 4, Census Tract 208	1,393	100	0	0	0	0	0	9.1
Northampton County	**299,225**	**80**	**11**	**5**	**3**	**2**	**20**	**9.8**
Block Group 1, Census Tract 146	1,466	58	21	11	0	11	42	5.7
Block Group 1, Census Tract 159.01	1,481	83	6	12	0	0	17	5.5
Block Group 4, Census Tract 159.01	1,836	100	0	0	0	0	0	4.2
Block Group 1, Census Tract 159.02	1,225	95	4	0	0	1	5	4.3
Block Group 2, Census Tract 159.02	1,409	98	2	0	0	0	2	7.4
Block Group 1, Census Tract 160.01	1,494	97	1	0	1	1	3	0.9
Block Group 1, Census Tract 165	596	79	6	5	0	10	21	1.5
Block Group 1, Census Tract 167	3,096	93	4	2	0	1	7	2.9
Block Group 1, Census Tract 169.02	1,595	95	5	0	0	0	5	2.6
Block Group 2, Census Tract 169.02	988	99	0	0	0	1	1	1.1

TABLE 4.8.10-1 Race and Ethnicity/Poverty by Census Block Group, 2014								
		Percent of Total						
State/County/Block Group	**Total Population**	**White a/**	**Hispa-nic Origin**	**African Ameri-can/ Black a/**	**Asian a/**	**Other Race a/ b/**	**Total Minority**	**Below Poverty**
Block Group 2, Census Tract 176.05	1,422	78	9	1	12	0	22	2.4
Block Group 1, Census Tract 176.07	3,064	70	3	11	11	6	30	5.7
Block Group 2, Census Tract 176.07	1,948	87	10	3	0	0	13	0.0
Block Group 1, Census Tract 180.01	546	94	6	0	0	0	6	6.4
Block Group 2, Census Tract 180.01	2,131	92	6	0	1	1	8	4.1
Block Group 3, Census Tract 180.01	1,461	95	5	0	0	0	5	7.5
Block Group 2, Census Tract 181	1,656	94	0	0	2	4	6	4.8
Block Group 4, Census Tract 181	1,641	97	2	0	1	0	3	0.0
Bucks County	**626,205**	**86**	**5**	**4**	**4**	**2**	**14**	**5.9**
Block Group 1, Census Tract 1066	1,147	96	1	0	2	1	4	7.1
Block Group 2, Census Tract 1066	842	93	2	0	0	5	7	6.3
NEW JERSEY	**8,874,374**	**58**	**19**	**13**	**9**	**2**	**42**	**10.7**
Hunterdon County	**126,746**	**87**	**6**	**2**	**3**	**1**	**13**	**4.2**
Block Group 3, Census Tract 105	1,068	98	0	0	0	1	2	4.1
Block Group 4, Census Tract 105	1,329	82	9	8	0	1	18	0.8
Block Group 2, Census Tract 106	3,264	95	3	0	2	0	5	1.0
Block Group 1, Census Tract 115	1,486	93	3	0	2	2	7	5.7
Block Group 2, Census Tract 115	1,864	94	2	1	1	2	6	2.2
Block Group 3, Census Tract 115	1,965	98	1	0	2	0	2	2.1
Block Group 1, Census Tract 116	2,206	96	1	0	1	1	4	1.5
Block Group 2, Census Tract 116	2,330	98	0	0	0	2	2	0.3
Block Group 1, Census Tract 118	1,427	92	3	1	2	2	8	2.9
Block Group 2, Census Tract 118	1,388	68	7	22	3	1	32	5.7
Mercer County	**369,526**	**53**	**16**	**20**	**10**	**2**	**47**	**11.7**
Block Group 2, Census Tract 38	2,479	87	3	8	2	0	13	3.4
Block Group 3, Census Tract 38	3,367	90	1	0	8	2	10	2.3
Block Group 2, Census Tract 39.04	3,750	65	4	6	19	7	35	1.0

Notes:
a/ Non-Hispanic only. The federal government considers race and Hispanic/Latino origin to be two separate and distinct concepts. People identifying Hispanic or Latino origin may be of any race. The data summarized in this table present Hispanic/Latino as a separate category.
b/ The “Other Race” category presented here includes census respondents identifying as “American Indian and Alaska Native,” “Native Hawaiian and Other Pacific Islander,” “Some Other Race,” and “Two or more races.”
Source: U.S. Census Bureau 2015e, 2015g

The minority population in each census block group was also compared with its respective county average in 2014 to identify areas where the minority population is potentially “meaningfully greater” than the minority population in the general population (defined as

20 percent higher than the benchmark region). One of the blocks groups that would be crossed by the Project had a total minority population that was 20 percent higher than the respective county average. Census block group 146.01 in Northampton County, Pennsylvania had a total minority population that was 22 percent higher than the corresponding county average (42 percent compared to 20 percent) (U.S. Census Bureau 2015e).

Income and Poverty

Median household income in the counties that would be crossed in Pennsylvania ranged from 85 percent (Luzerne County) to 145 percent (Bucks County) of the state median. Median household income was higher than the state median in both counties that would be crossed in New Jersey (U.S. Census Bureau 2015f). None of the counties that would be crossed by the Project had more than 20 percent of their population below the poverty level in 2014 (table 4.8.10-1).

As with the race and ethnicity assessment above, data on income and poverty were also reviewed at the census block group levels. Two of the census block groups that would be crossed by the Project had more than 20 percent of their total population below the poverty level in 2014: census block group 208.3 in Carbon County, Pennsylvania (21.2 percent); and census block group 2119.3 in Luzerne County, Pennsylvania (26.2 percent) (U.S. Census Bureau 2015g).

4.8.10.2 Impact Assessment

The Project would cross a total of 53 census block groups in six counties and two states. The above review of demographic and economic data identified one census block group that could be considered a potential minority population and two other census block groups that could be considered potential low income populations. Census block group 146.01 in Northampton County, Pennsylvania had a total minority population that was 22 percent higher than the corresponding county average (42 percent compared to 20 percent) (U.S. Census Bureau 2015e). The share of the total population below the poverty level exceeded 20 percent in Census block group 208.3 in Carbon County, Pennsylvania (21.2 percent); and census block group 2119.3 in Luzerne County, Pennsylvania (26.2 percent) (U.S. Census Bureau 2015g). None of the remaining 50 block groups that would be crossed were identified as potential minority or low income communities.

Construction and operation of the Project would not be expected to have high and adverse human health or environmental effects on any nearby communities or result in adverse and disproportionate human health or environmental effects to minority or low income communities. Adverse construction-related impacts would likely include emissions from construction equipment, increases in dust noise, and increases in local traffic that could result in temporary delays at some highway crossings. These impacts would be temporary and localized and are not expected to be high. The compressor station would be a new source of permanent emissions. The proposed compressor station is not located in one of the census block group areas identified as potential minority or low income communities. In addition, PennEast would implement a series of measures to minimize these types of potential impacts (see sections 4.8.5, 4.10.1, and 4.10.2).

PennEast has indicated that it would develop a Traffic Management Plan that would include mitigation measures designed to minimize traffic-related impacts. Major road crossings, for example, would typically be accomplished using conventional boring techniques or HDD. PennEast would also implement mitigation measures, as necessary, to minimize impact from construction noise on nearby noise-sensitive areas (NSAs). For noise related to HDD activity, PennEast would consider temporarily relocating residents in affected NSAs on a case-by-case basis. Operation of the proposed compressor station would also comply with the 55 dBA day-night sound level (L_{dn}) threshold. Measures to control fugitive dust emissions would include dust suppression by water spray for open, uncontained sources of particulate matter emissions and unpaved roads. See section 4.10 of this EIS for additional discussion of impacts on air and noise and measures used to minimize those impacts.

The Project facilities would also be designed, constructed, operated, and maintained in accordance with or to exceed the PHMSA's minimum federal safety standards as specified in 49 CFR 192. These regulations, which are intended to protect the public and to prevent natural gas facility accidents and failures, apply to all areas along the proposed pipeline routes regardless of the presence or absence of minority or low income populations.

4.9 CULTURAL RESOURCES

Section 106 of the NHPA (16 USC 470) requires federal agencies to take into account the effects of their undertakings (including the issuance of Certificates) on properties listed in or eligible for listing in the NRHP and to provide the ACHP an opportunity to comment on the undertaking. PennEast, as a nonfederal party, is assisting the FERC in meeting its obligations under Section 106 by preparing the necessary information, analyses, and recommendations as authorized by 36 CFR 800.2(a)(3).

PennEast conducted archival research to identify historic aboveground properties and locations for additional subsurface testing in areas with potential for prehistoric and historic archaeological sites. PennEast then conducted field surveys for architectural resources and archaeological sites.

4.9.1 Consultations

On January 13, 2015, FERC sent copies of the NOI for the Project to a wide range of stakeholders, including the ACHP, the National Park Service (NPS), the Pennsylvania Bureau of Historic Preservation (serves as Pennsylvania State Historic Preservation Office [SHPO]), New Jersey's Historic Preservation Office (New Jersey SHPO), and federally recognized tribes (tribes) that may have an interest in the Project area. The NOI contained a paragraph about Section 106 of the NHPA, and stated that we use the notice to initiate consultations with the SHPO, and to solicit their views and those of other government agencies, interested tribes, and the public on the Project's potential effects to historic properties.

In addition to the FERC's notification process, PennEast contacted the SHPOs and tribes that might attach cultural or religious significance to cultural resources in the Project area.

4.9.1.1 State Historic Preservation Officers

Pennsylvania

Since August 2014, PennEast has been participating in ongoing communication with the Pennsylvania SHPO and Table 4.9.1-1 summarizes correspondence with the Pennsylvania SHPO. In a letter dated August 20, 2014, PennEast provided the Pennsylvania SHPO with a description of the Project, the cultural resources protocol PennEast would follow to conduct Project-related studies, and the Unanticipated Discovery Plan. In a letter dated September 10, 2014, the Pennsylvania SHPO approved the work plan methods and concurred with the proposed Unanticipated Discovery Plan.

On October 25, 2014, January 14, 2015, March 31, 2015, September 1, 2015 and October 1, 2015, PennEast provided Project route updates to the Pennsylvania SHPO. The Pennsylvania SHPO acknowledged receipt of the Project updates in a letters dated December 4, 2014, March 2, 2015, April 22, 2015, September 1, 2015, and November 4, 2015. The Pennsylvania SHPO, in a letter dated March 2, 2015, indicated that the Project may have an effect to properties that may be eligible to the NRHP. In its letter of April 22, 2015, the Pennsylvania SHPO informed PennEast that significant archaeological sites are located in or near the Project and that archaeological and aboveground resources surveys would be necessary. On September 11, 2015, the Pennsylvania SHPO reiterated the need for both archaeological and historic architectural surveys.

In a letter dated September 1, 2015, PennEast requested the Pennsylvania SHPO to concur that no archaeological investigation would be required prior to a geotechnical bore proposed ten feet east of the towpath of the Delaware Division of the Pennsylvania Canal; a National Historic Landmark (NHL). The Pennsylvania SHPO concurred with this request in a letter dated September 25, 2015.

PennEast submitted an archaeological identification survey report to the Pennsylvania SHPO on September 24, 2015. Also PennEast provided the Unanticipated Discovery Plan; revised to reflect FERC comments. The Pennsylvania SHPO commented on the report in its letter of October 22, 2015. PennEast's reconnaissance-level historic architectural survey report was submitted to the Pennsylvania SHPO on September 30, 2015, and the Pennsylvania SHPO provided comments in its letter dated October 21, 2015.

PennEast submitted a Cultural Resources Notice for the proposed Kidder Compressor Station to Pennsylvania SHPO in its letter of March 16, 2016. It summarized the negative results of archaeological survey provided of the area in a previous report and provided a desktop review of the 66-acre parcel indicating no presence of buildings, structures, objects, districts, or cultural landscapes within 0.25-mile radius of the proposed compressor station and recommending that there would be no indirect effects associated with construction of the compressor station. No additional studies were recommended by PennEast. In its letter of March 23, 2016, Pennsylvania SHPO concurred that the compressor station had no potential to affect historic properties and we agree.

In a letter dated March 14, 2016, PennEast recommended a change in archaeological survey methodology on the T2 terrace of the Susquehanna River in Luzerne County. Pennsylvania SHPO concurred with this request in a letter dated April 11, 2016.

In a letter dated April 14, 2016, the Pennsylvania SHPO provided comments on PennEast's archaeological survey addendum report. The PA SHPO concurred with PennEast's recommendations and we agree.

TABLE 4.9.1-1

Correspondence with the Pennsylvania SHPO

Date	From	To	Summary of Letter
August 20, 2014	PennEast	SHPO	Provided Project description, described cultural resources protocol to be used to perform studies, transmitted Unanticipated Discovery Plan
September 10, 2014	SHPO	PennEast	Approved work plan methodologies and concurred with proposed Unanticipated Discovery Plan
October 25, 2014	PennEast	SHPO	Provided Project route updates
December 4, 2015	SHPO	PennEast	Acknowledged receipt of the Project route updates
January 14, 2015	PennEast	SHPO	Provided Project route updates
March 2, 2015	SHPO	PennEast	Acknowledged receipt of the additional Project route updates and indicated that the Project may have an effect to properties that may be eligible to the NRHP
March 31, 2015	PennEast	SHPO	Provided Project route variations

TABLE 4.9.1-1 Correspondence with the Pennsylvania SHPO			
Date	From	To	Summary of Letter
April 22, 2015	SHPO	PennEast	Informed PennEast that significant archaeological sites are located in or near the Project area and that archaeological survey would be required; including aboveground historic resources review
September 1, 2015	PennEast	SHPO	Provided Project route updates and stated that a geotechnical bore would be necessary near the Delaware Division of the Pennsylvania Canal, a NHL. PennEast requested concurrence that no archaeological investigation would be required prior to excavation of the bore
September 11, 2015	SHPO	PennEast	Acknowledged receipt of Project reroutes and noted cultural resources investigations would be conducted and reports submitted for review and comment
September 24, 2015	PennEast	SHPO	Submitted the archaeological survey report and the revised Unanticipated Discovery Plan for review and comment
September 25, 2015	SHPO	PennEast	Concurred that no archaeological investigations would be necessary prior to the geotechnical bore
September 30, 2015	PennEast	SHPO	Submitted historic architectural survey report for review and comment
October 1, 2015	PennEast	SHPO	Provided updated pipeline routes
October 21, 2015	SHPO	PennEast	Provided comments on the historic architectural survey report
October 22, 2015	SHPO	PennEast	Provided comments on archaeological survey report
November 4, 2015	SHPO	PennEast	Acknowledges receipt of the Project alignment updates and directed PennEast to the comments of October 21 and 22, 2015
March 14, 2016	PennEast	SHPO	Recommended a change in archaeological survey methodology on the T2 terrace of the Susquehanna River in Luzerne County
March 16, 2016	PennEast	SHPO	Cultural Resources Notice for Proposed Kidder Compressor Station – recommends no additional studies necessary and no cultural resources would likely be affected
March 23, 2016	SHPO	PennEast	Concurred that the Kidder Compressor Station had no potential to affect historic properties
April 11, 2016	SHPO	PennEast	Concurred with PennEast's proposed change in archaeological survey methodology on the T2 terrace of the Susquehanna River in Luzerne County
April 14, 2016	SHPO	PennEast	Provided comments on archaeological survey addendum report

New Jersey

PennEast has been participating in ongoing communication with the New Jersey SHPO since August 2014 and their correspondence is summarized in table 4.9.1-2. By letter dated August 20, 2014, PennEast provided the New Jersey SHPO with a description of the Project, the protocol that PennEast proposed to implement to perform cultural resources studies, and the Unanticipated Discovery Plan. On September 16, 2014, PennEast met with the New Jersey SHPO to discuss the Project, the methods proposed for conducting archaeological and historic architectural surveys, and development of an archaeological sensitivity model. The previously submitted Unanticipated

Discovery Plan was also discussed. In a letter dated September 24, 2014, the New Jersey SHPO provided formal comments on the work plan along with a list of tribes that may have an interest in the Project.

In letters dated January 14, 2015, January 24, 2015, and March 31, 2015, PennEast sent Project route updates to the New Jersey SHPO. In its letter of January 30, 2015, the New Jersey SHPO acknowledged the Project changes and inquired as to the status of the revisions to the work plan. PennEast sent a revised work plan and Unanticipated Discovery Plan to the New Jersey SHPO in a letter dated February 2, 2015. In a letter dated February 18, 2015, the New Jersey SHPO commented on FERC's NOI and PennEast's revised work plan. The New Jersey SHPO also requested PennEast to revise the archaeological sensitivity model. Subsequently on March 6, 2015, PennEast provided the New Jersey SHPO with a revised cultural resources sensitivity model. In a letter dated April 8, 2015, the New Jersey SHPO responded to FERC that the revised archaeological sensitivity model adequately addressed the New Jersey SHPO concerns.

In its October 21, 2015 letter to FERC, the New Jersey SHPO requested FERC to consider the Ramapough Lenape Indian Nation as a consulting party in the section 106 process for the Project.

In a letter dated October 22, 2015, the New Jersey SHPO provided its comments on the archaeological survey report (Ziesing et al. 2015a). The New Jersey SHPO expressed concern that the field testing protocol did not appear to be consistent with the New Jersey survey guidelines, and requested clarification regarding the field methods employed for the Project survey and the presentation of data in the report. In a letter dated March 18, 2016, the New Jersey SHPO indicated that PennEast's archaeology survey report, revised in December 2015, was acceptable.

The New Jersey SHPO provided comments on the historic architecture survey report in a letter dated October 23, 2015 and did not agree with all of PennEast's recommendations. The New Jersey SHPO requested additional study, and directed PennEast to consult with municipalities directly to obtain lists of local historic properties that may not be available online.

In a letter dated March 16, 2016, the New Jersey SHPO provided comments on PennEast's revised archaeological survey report (Ziesing et al. 2015b). The New Jersey SHPO did not agree with PennEast's site-specific assessment of resource eligibility for listing in the New Jersey Register of Historic Places and NRHP. The New Jersey SHPO stated that pending completion of archaeological survey within the entirety of the proposed APE, it did not have sufficient information to evaluate the nature and significance of archaeological historic properties in the APE. Further, the New Jersey SHPO did not concur with PennEast's recommendations for avoidance of archaeological resources and requested PennEast to consider the relationship between reported landscape features and aboveground historic properties within the APE. The New Jersey SHPO again requested PennEast to engage in public consultation regarding historic properties that may be located within the APE. Additionally, given that PennEast's predictive model indicated many high sensitivity areas yet the field surveys reported few precontact archaeological sites, New Jersey SHPO requested PennEast to address and discuss the variables used to develop the model and consider their implications for the remaining survey and the nature of land use, settlement, and exploitative territories by precontact populations in the area of the Project.

TABLE 4.9.1-2 Correspondence with the New Jersey SHPO			
Date	From	To	Summary of Letter
August 20, 2014	PennEast	SHPO	Provided Project description, described cultural resources protocol to be used to perform studies, transmitted Unanticipated Discovery Plan
September 24, 2014	SHPO	PennEast	Provided comments on the work plan along with a list of tribes that may have an interest
January 14, 2015	PennEast	SHPO	Provided Project route updates
January 24, 2015	PennEast	SHPO	Provided Project route updates
January 30, 2015	SHPO	PennEast	Acknowledged receipt of the Project changes and inquired about revisions to the work plan.
February 2, 2015	PennEast	SHPO	Provided revised scoping document and Unanticipated Discovery Plan
February 18, 2015	SHPO	FERC	Commented on the NOI, the revised work plan, and their requested that the archaeological sensitivity model be updated.
March 6, 2015	PennEast	SHPO	Provided a revised archaeological sensitivity model
March 31, 2015	PennEast	SHPO	Provided additional route variations
April 8, 2015	SHPO	FERC	Accepted the revised archaeological sensitivity model
October 21, 2015	SHPO	FERC	Requested FERC to consider the Ramapough Lenape Indian Nation as a consulting party
October 22, 2015	SHPO	FERC	Provided comments on the archaeological survey report and expressed concern about the fieldwork
October 23, 2015	SHPO	FERC	Provided comments on the historic architecture survey report and did not agree with all of PennEast's recommendations
March 18, 2016	SHPO	FERC	Provided comments on the revised archaeological survey report

4.9.1.2 National Park Service

In February 2015, NPS filed with the Commission its comments on the NOI. NPS expressed concerns regarding potential Project effects to the Appalachian National Scenic Trail, the Lower Delaware Wild and Scenic River, the Captain John Smith Chesapeake National Historic Trail, and the Delaware Canal.

The Project crosses the Appalachian National Scenic Trail between MPs 51.1 and 51.2 on the Commonwealth of Pennsylvania land. The Appalachian National Scenic Trail is eligible for listing on the NRHP and is managed by the NPS. The NPS recommends the utilization of existing utility corridors and crossings of the Appalachian National Scenic Trail. Consultation is ongoing between PennEast, the NPS, and the Commonwealth of Pennsylvania regarding the proposed Project crossing of the Appalachian National Scenic Trail.

NPS also commented on the Project crossing of the Lower Delaware River; which it was designated a National Wild and Scenic River. NPS noted that the pipeline would potentially impact the Durham Caves and Durham Mines and protected lands associated with Milford Bluffs. NPS recommended that PennEast consider HDD for the proposed water crossing or consider an alternative that would involve co-location with existing gas pipeline or utility corridors in order to reduce or minimize effects. PennEast will cross the river by HDD between MPs 77.4 and 77.9. The Project will avoid effects to the noted sensitive areas.

Additionally, NPS expressed concern about the proposed PennEast pipeline crossing of the North Branch of the Susquehanna River which includes part of the river-based Captain John Smith Chesapeake National Historic Trail. NPS' prime concern involves effects to archaeological resources and cultural landscapes that may be of importance to tribes. PennEast and FERC requested tribal assistance in identifying any properties of traditional, religious, or cultural importance to a tribe that may be affected by the Project. Responses are discussed in section 4.9.1.4. No archaeological resources have been identified within this area as a result of studies performed by PennEast and we have not received any specific concerns from tribes for this location.

The crossing of the Delaware Canal by the Project was noted by NPS as a concern. The Delaware Canal, the longest-lived canal in the United States and a significant resource for its role in opening the anthracite coalfields to markets in Philadelphia and New York City, is listed in the NRHP as an NHL. We agree with NPS' concern about potential Project effects. PennEast's proposal to cross the Delaware River by HDD would avoid effects to the Delaware Canal.

NPS also noted the Project crossings through the Delaware and Lehigh National Heritage Corridor and the Crossroads of the American Revolution National Heritage Area. NPS requested PennEast to contact State and local land managers associated with these areas. To date no communications has been filed.

4.9.1.3 Tribal Consultations

PennEast initiated outreach to 15 tribes on December 31, 2014 and sent letters that described the Project, invited each tribe to participate in the FERC process, and requested a formal response via letter or e-mail confirming or declining each tribe's interest in participating in the FERC process. The correspondence is summarized in appendix G-19. Eight of the tribes responded that they were interested in consulting on the Project, while seven of the tribes did not respond. Follow-up telephone calls and e-mails were sent by PennEast to tribes on August 4, 2015. The tribes contacted included Absentee-Shawnee Tribe of Indians of Oklahoma, Cayuga Nation, Delaware Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe of Oklahoma, Oneida Indian Nation, Oneida Nation of Wisconsin, Onondaga Nation, Seneca-Cayuga Tribe of Oklahoma, Seneca Nation of Indians, Shawnee Tribe, Stockbridge-Munsee Band of the Mohicans, St. Regis Mohawk Tribe, Tonawanda Seneca Nation, and Tuscarora Nation.

In a letter dated February 11, 2015, the Delaware Nation stated that no resources of interest to them would be affected by the Project. They requested to be contacted in the event that unanticipated discoveries are made during construction.

The Delaware Tribe of Indians wrote on January 8, 2015 and requested to enter into consultation.

In a letter dated January 16, 2015, the Oneida Indian Nation contacted PennEast to discuss the Project and the tribe's concerns. The tribe then filed a letter dated January 20, 2015, requesting information on cultural resources survey methods that would be implemented by PennEast.

In an e-mail dated February 19, 2015, the Seneca Nation of Indians stated that the tribe had no concerns with the Project, and they would defer to the Delaware Nation. Though, the Seneca Nation of Indians requested to be contacted if the Project scope changes or if cultural or burial sites are encountered during construction.

The Stockbridge-Munsee Band of Mohicans responded on January 27, 2015 and requested continuing consultation. The tribe requested a copy of field survey protocols which were provided by PennEast on February 5, 2015.

FERC sent consultation letters to the 15 tribes on June 22 and 23, 2015, inviting their participation and to identify any properties of traditional, religious, or cultural importance to their tribe that may be affected by the Project. We have not received any responses to the letters.

On April 21, 2016, the Stockbridge-Munsee Band of Mohicans expressed concern that two sites may be of cultural interest to them and that the sites should be evaluated to determine if they may meet the criteria to be eligible to the NRHP. They suggested that sites 36LU0110 and 36LU0337 appear to be culturally significant and warrant further testing to determine if they are eligible to the NRHP. PennEast has stated that site evaluation or avoidance would be conducted at sites 36LU0110 and 36LU0337.

4.9.1.4 Local Organizations

Representatives of local governments within the Project area are participants in the Section 106 review of the Project and would be provided cultural resources information within their jurisdiction for review and comment. When cultural resources survey and/or evaluation reports are available within a local government's jurisdiction, PennEast would provide the information to the representative of a local government for review and comment. In keeping with Section 304 of the NHPA, and the FERC's regulations at 18 CFR 380.12(f)(4), sensitive cultural resources data should be kept confidential and not released to the public. Any comments filed with the Commission from a local government containing location, character, or ownership information about cultural resources must be marked "**Contains Privileged Information – Do Not Release**" and should be filed separately from the remaining information which should be marked "**Public**."

Additionally, in December 2015, PennEast consulted with local organizations in Pennsylvania to request their input regarding known cultural resources located within the Project boundaries. The local organizations contacted were the following: Society for Pennsylvania Archaeology, Bucks County Historical Society, Delaware and Lehigh National Heritage Center, Durham Historical Society, Governor Wolf Historical Society, Historic Bethlehem Museums and Sites, Jacobsburg Historical Society Inc., Lehigh Valley Railroad Historical Society, Lower Saucon Township Historical Society, Luzerne County Historical Society, Mauch Chunk Historical Society, Moravian Historical Society, Northampton County Historical and Genealogical Society, Pennsylvania Canal Society, Preservation Pennsylvania, and Riegelsville Historical Society.

At the New Jersey SHPO's suggestion, PennEast consulted with local organizations in New Jersey. PennEast's correspondence to these entities on December 9, 2015 requested their input regarding known cultural resources located within the Project boundaries. The local organizations contacted were the following: Archaeological Society of NJ, Alexandria Historical Society, Delaware Township Historical Society, Garden State Preservation Trust, Holland Township Preservation Commission, Hopewell Township Historic Preservation Commission, Hunterdon

County Cultural & Heritage Commission, Hunterdon County Historical Society, Kingwood Township Historical Society, Lambertville Historical Society, Mercer County Cultural and Heritage Commission, Milford Borough Historical Society, NJ Chapter National Railroad Historical Society, New Jersey Historical Commission, New Jersey Historic Trust, Borough of Pennington Historic Preservation Commission, Preservation New Jersey, Township of West Amwell Historic Preservation, Cherokee Nation of New Jersey, Cherokee Tribe of New Jersey, and Sand Hill Indian Historical Association. The Milford Borough Historical Society, in a letter dated February 19, 2016, expressed an interest in participating in reviews of historic and cultural resources that may be impacted by the Project.

A New Jersey state-recognized tribe, the Nanticoke Lenni-Lenape Tribal Nation, filed a letter dated September 16, 2015 to FERC expressing concern regarding potential effects of the Project through their historic territory. Potential effects on one site was noted. They requested to be informed of plans to mitigate the potential negative environmental impact and disruption of sites. PennEast has committed to analyzing the route in this area to avoid and minimize effects to archaeological sites.

In an e-mail correspondence between October 20 and October 29, 2015, with PennEast, the Ramapough Lenape Indian Nation, a New Jersey state-recognized tribe, requested copies of the cultural resources reports. In a letter dated March 26, 2016 to FERC from the group objected to PennEast's claim of completion of survey. PennEast has not filed a response. Cultural resources investigations have not been completed for the Project.

We have received three requests for consulting party status. These were from Judith Sullivan, Ramapough Conservancy Inc., Marilyn Cummings, Delaware Township Historic Advisory Committee, and Karen Lutz, Appalachian Trail Conservancy.

4.9.2 Results of Surveys

Human occupation throughout the Project area extends to at least 10,000 years ago. Sites related to the earliest time periods, Paleoindian and Early and Middle Archaic Periods, tend to be small, dispersed sites with few associated artifacts. Site rarity is interpreted as indicative of sparse populations focused on seasonally available resource procurement. Through time, site density and site types increase and artifact changes reflect both functional and stylistic use, attributable to cultural groups and identities. Technological innovations including development and use of pottery, replacement of spear points with arrow points, and development of agriculture and associated settlements are recognizable in the archaeological record. Euroamerican entry into the Project area and disruption of Native American cultural patterns are somewhat recognizable in the archaeological record and in the written historic record. Historic period settlements, trade, transportation, manufacturing, agriculture, urbanization, and suburbanization all contribute to the archaeological record.

PennEast conducted archaeological identification surveys within a 400-foot-wide study corridor along the proposed pipeline route. At facilities not encompassed by the study corridor (such as, access roads and pipe yards), a survey was conducted within the proposed limit of disturbance for those facilities. The Project direct APE encompasses the limit of ground disturbance of the Project, usually as a result of construction. Pedestrian survey and field testing was guided by a GIS archaeological sensitivity model and review of historic period maps. An assessment of the potential for deeply buried deposits in areas where alluvial soils were inferred to be greater than one meter in depth was performed by a geomorphologist. For resources that may have the potential to be eligible for listing to the NRHP and that could not be avoided by the Project, PennEast has performed or would conduct site evaluation to determine if the resource may be potentially eligible to the NRHP.

PennEast also conducted historic architecture survey within the direct and indirect APE. The indirect APE comprises areas around the direct APE where Project effects may occur through visual, audible, or other changes in the settings and views of aboveground cultural resources. The indirect APE for PennEast was defined as one-quarter mile around the Project.

Reports of these surveys are listed in Table 4.9.2-1. These served as a basis for our analyses of Project effects.

TABLE 4.9.2-1

List of Cultural Resources Reports Produced for PennEast

Report Authors	Date	Report Title
Pennsylvania		
Andrew Wyatt, Kristopher Montgomery, James Burton, Eileen Hood, Matthew Harris, and Joseph Kwiatek	2015	*Phase I Archaeological Survey Report, PennEast Pipeline Project, Luzerne, Carbon, Northampton, and Bucks Counties, Pennsylvania*. Prepared for PennEast Pipeline Company, LLC by URS Corporation, Burlington, New Jersey
Andrew Wyatt, Kristopher Montgomery, James Burton, and Joseph Kwiatek	2016	*Phase I Archaeological Survey Report, PennEast Pipeline Project, Luzerne, Carbon, Northampton, and Bucks Counties, Pennsylvania, Addendum 1.* Prepared for PennEast Pipeline Company, LLC by URS Corporation, Burlington, New Jersey.
Vanessa Zeoli and Eileen Hood	2015	Reconnaissance-Level Historic Architectural Survey Report, PennEast Pipeline Project, Luzerne, Carbon, Northampton, and Bucks Counties, Pennsylvania. Prepared for PennEast Pipeline Company, LLC by URS Corporation, Burlington, New Jersey.
Vanessa Zeoli and Eileen Hood	2015	*Reconnaissance-Level Historic Architectural Survey Report, PennEast Pipeline Project, Hunterdon and Mercer Counties, New Jersey*. Prepared for PennEast Pipeline Company, LLC by URS Corporation, Burlington, New Jersey.
New Jersey		
Grace Ziesing, Joseph Kwiatek, Eileen Hood, Robert Kingsley, and Brian Albright	2015a	*Phase I Archaeological Survey Report, PennEast Pipeline Project, Hunterdon and Mercer Counties, New Jersey.* Prepared for PennEast Pipeline Company, LLC by URS Corporation, Burlington, New Jersey.
Grace Ziesing, Joseph Kwiatek, Eileen Hood, Robert Kingsley, and Brian Albright	2015b	*Phase I Archaeological Survey Report, PennEast Pipeline Project, Hunterdon and Mercer Counties, New Jersey. Revised December 2015*. Prepared for PennEast Pipeline Company, LLC by URS Corporation, Burlington, New Jersey.
Vanessa Zeoli and Eileen Hood	2015	*Reconnaissance-Level Historic Architectural Survey Report, PennEast Pipeline Project, Hunterdon and Mercer Counties, New Jersey*. Prepared for PennEast Pipeline Company, LLC by URS Corporation, Burlington, New Jersey.

4.9.2.1 Pennsylvania

Archaeological Resources

Between August 2014 and July 2015, PennEast performed cultural resource surveys for 56.3 miles (approximately 2730 acres) along the proposed pipeline route and where survey permission was granted (Wyatt et al. 2015). An additional 380 acres were surveyed within the study corridor and the limit of disturbance between July 2015 and February 2016 (Wyatt et al.

2016). Reports of these surveys are listed in Table 4.9.2-1. PennEast reported a total of 23 archaeological sites, 15 within the direct APE, (five of which are partially within and partially adjacent to the APE) and 8 sites adjacent to the APE.

The survey identified ten archaeological sites within the direct APE. One precontact site relates to the Late Woodland and Late Archaic time periods (36LU0110). Another precontact site relates to the Terminal Archaic and Late Woodland time periods (36CR0149). Three additional sites (36NM0328, 36NM0337, and 36NM0338) relate to unknown precontact time periods. Five historic period sites include a nineteenth century farmstead (36NNM0346), a nineteenth century springbox (36NM0347), a refuse deposit containing artifacts dating from the late nineteenth to early twentieth centuries (36NM0339), a twentieth century domestic site (36NM0324), and a historic period domestic site of unknown chronology (36NM0342).

The precontact sites 36LU0110 and 36CR0149 were recommended by PennEast as potentially eligible to the NRHP. The Pennsylvania SHPO concurred and we agree. PennEast will treat 36NM0328 as potentially eligible for the NRHP and agreed to conduct a site evaluation. Pennsylvania SHPO agreed and we concur.

PennEast recommended that the portion of the historic farmstead site 36NM0346 located within the APE is unlikely to contribute to the site's NRHP eligibility and that no further investigation or avoidance is needed. Pennsylvania SHPO agreed and we concur.

PennEast recommended sites 36NM0324, 36NM0337, 36NM0338, 36NM0339, and 36NM0342 as not eligible to the NRHP. The Pennsylvania SHPO concurred and we agree. No further investigation or avoidance of these sites would be needed.

Five archaeological sites (36LU0337, 36NM0330, 36NM0345, 36NM0346, and 36NBU0454) are located partially within and adjacent to the APE. Site 36LU0337 is a multicomponent site that contains both precontact artifacts of an unknown time period and late nineteenth through mid-twentieth century refuse deposits. PennEast would avoid the portion of the site adjacent to the APE with fencing and monitoring during construction. The Pennsylvania SHPO requested PennEast to complete the site identification survey and provide a report for review. The report would also be reviewed by the Commission.

At precontact period site 36NM0330, a site related to an unknown precontact period of use. PennEast would avoid impacts using fencing and monitoring during construction. Pennsylvania SHPO agreed. We also agree with PennEast's recommended action.

PennEast recommended that at the nineteenth century farmstead site 36NM0345 the portion of the site within the APE is unlikely to contribute to the site's potential to be eligible to the NRHP. PennEast will protect the adjacent portion of the site with fencing and construction monitoring. Pennsylvania SHPO agreed to PennEast's recommendation and we concur.

No further investigation or avoidance was recommended by PennEast at the nineteenth century farmstead Site 36NM0346. PennEast would avoid this site by HDD. We agree with PennEast's recommended actions and the Pennsylvania SHPO concurred.

At 36BU0454, a precontact site of unknown time association, PennEast would cover the portion of the site within the APE with geotextile and fill in addition to using fencing and monitoring during construction. PennEast has not filed a site evaluation report, avoidance plan, or the Pennsylvania SHPO comments.

PennEast reported eight sites adjacent to the APE. At four potentially NRHP-eligible precontact sites (36LU0338, 36NM0329, 36NM0336, and 36NM0343), one potentially NRHP-eligible historic period nineteenth century industrial site (36NM0327), and one cemetery (CEMLU0008), PennEast would prevent impacts during construction by placement of fencing along the edge of the construction right-of-way and monitoring during construction. At other sites adjacent to the APE including a historic nineteenth century barn (36LU0330) and one precontact site of unknown time association (36LU0339), PennEast proposes no further investigation or avoidance. The Pennsylvania SHPO concurred with PennEast's recommended action at adjacent sites and we agree.

PennEast has a number of survey reports, avoidance plans, evaluation studies and reports, and potential treatment plans pending. Table 4.9.2-2 lists some of these additional activities.

TABLE 4.9.2-2

Archaeological Resources Within and Adjacent to APE in Pennsylvania

Site Number	Cultural Affiliation / Site Type	PennEast Recommended NRHP Status	PennEast Recommended Action	Pennsylvania SHPO Comment
Sites within APE				
36LU0110	Prehistoric: Late Woodland, Late Archaic\Unknown	Potentially eligible	Complete survey and evaluation	Concurrence that PennEast to complete survey and provide report to PA SHPO. April 14, 2016
36CR0149	Prehistoric: Terminal Archaic, Late Woodland/Unknown	Potentially eligible	Conduct evaluation	Concurrence October 22, 2015
36NM0324	20th century/domestic	Not eligible	No further investigation or avoidance	Concurrence October 22, 2015
36NM0328	Prehistoric/Unknown	Pending	Conduct evaluation	Concurrence October 22, 2015
36NM0337	Prehistoric/Unknown	Not eligible	No further investigation or avoidance	Concurrence October 22, 2015
36NM0338	Prehistoric/Unknown	Not eligible	No further investigation or avoidance	Concurrence October 22, 2015
36NM0339	Late 19th-early 20th century/Refuse deposit	Not eligible	No further investigation or avoidance	Concurrence October 22, 2015
36NM0346	Historic/Unknown/Domesti c	Not eligible	No further investigation or avoidance	Concurrence October 22, 2015
36NM0346	Historic: 19th century/Farmstead	Portion of site within APE unlikely to contribute to NRHP eligibility	No further investigation or avoidance needed. Avoidance by HDD	Concurrence April 14, 2016
36NM0347	Historic: 19th century/Springbox	Not eligible	No further work	Concurrence April 14, 2016

TABLE 4.9.2-2 Archaeological Resources Within and Adjacent to APE in Pennsylvania				
Site Number	**Cultural Affiliation / Site Type**	**PennEast Recommended NRHP Status**	**PennEast Recommended Action**	**Pennsylvania SHPO Comment**
Sites partially within and adjacent to APE				
36LU0337	Prehistoric: Unknown; Historic: Late 19th through mid-20th century\Refuse Deposit	Portion of site within APE unlikely to contribute to NRHP eligibility	Avoidance (fencing and monitoring)	Complete survey and provide report to NJ SHPO. April 14, 2016
36NM0330	Prehistoric/Unknown	Portion of site within APE does not contribute to NRHP eligibility	Avoidance (fencing and monitoring)	Concurrence October 22, 2015
36NM0345	Historic: 19th century/Farmstead	Portion of site within APE unlikely to contribute to NRHP eligibility	No further work within APE. Avoidance (fencing and monitoring)	Concurrence April 14, 2016
36NM0346	Historic: 19th century/Farmstead	Portion of site within APE unlikely to contribute to NRHP eligibility	No further investigation or avoidance needed. Avoidance by HDD	Concurrence April 14, 2016
36BU0454	Prehistoric: Unknown	Not evaluated	Within and Adjacent to APE Mark on construction plans, cover portion of site with geotextile and fill, fence and monitor during construction	Concurrence April 14, 2016
Sites adjacent to APE				
36LU0330	Historic 19th century barn	Not eligible	Adjacent to APE. No action	Concurrence October 22, 2015
36LU0338	Prehistoric: Terminal Archaic-Early Woodland\Unknown	Potentially eligible	Adjacent to APE Avoidance (fencing and monitoring)	Concurrence April 14, 2016
36LU0339	Prehistoric: Unknown	Not eligible	Adjacent to APE No further investigation or avoidance	October 22, 2015 April 14, 2016
36NM0329	Prehistoric/Late Woodland/Unknown	Potentially eligible	Adjacent to APE Avoidance (fencing and monitoring)	Concurrence October 22, 2015
CEMLU0008	Historic/ Cemetery	Sensitive resource	Adjacent to APE. Avoidance (fencing and monitoring)	Concurrence October 22, 2015
36NM0327	Historic: 19th century/Industrial	Potentially eligible	Adjacent to APE Avoidance (fencing and monitoring)	Concurrence October 22, 2015
36NM0336	Prehistoric: Middle Archaic, Late Woodland/Unknown	Potentially eligible	Adjacent to APE. Avoidance (fencing and monitoring)	Concurrence October 22, 2015
36NM0343	Prehistoric/Unknown	Potentially eligible	Adjacent to APE. Avoidance (fencing and monitoring)	Concurrence October 22, 2015

Archaeological surveys have not been completed. Table 4.9.2-3 lists the areas, by MP, that have surveys pending.

TABLE 4.9.2-3

PennEast Pipeline Segments Pending Surveys in Pennsylvania

Begin MP	End MP	Acres	Project Segment	Description
1.27	1.60	16.0	Pipeline corridor	Full survey corridor not surveyed
1.49	1.60	5.3	Work Area	PE-A-03
1.67-1.70	2.10	20.1	Pipeline corridor	Full survey corridor not surveyed
2.10	2.35	3.0	Pipeline corridor	~100 ft. width not surveyed
2.38	2.43	0.6	Pipeline corridor	~100 ft. width not surveyed
3.48-3.52	3.86-3.93	19.4	Pipeline corridor	Full survey corridor not surveyed
4.52	4.73-5.03	17.5	Pipeline corridor	Full survey corridor not surveyed
5.80	5.93	0.2	Pipeline corridor	Narrow wedge-shaped parcel not surveyed
6.03	6.96	18.0	Pipeline corridor	~160 ft. width not surveyed
6.03	6.96	11.3	Pipeline corridor	~100 ft. width not surveyed
6.97	-	1.0	Work Area	Unidentified work area at N end AR-006
7.32	7.55	7.7	Work Area	PE-A-04
8.80-8.95	9.10	11.4	Pipeline corridor / Access Road	AR-014 and full survey corridor not surveyed
9.10	-	3.5	Work Area / Access Road	PE-A-01 and AR-017
10.45	-	14.0	Work Area / Access Road	PE-A-02 and AR-021
10.57	10.78-11.1	17.9	Pipeline corridor	~1,100 ft full survey corridor and ~1,700 ft half-width not surveyed
11.38	11.53	3.3	Pipeline corridor	Irregular area not surveyed
12.90	13.00	2.3	Access Rd	AR-025
12.90	13.20	1.4	Pipeline corridor	Narrow strip not surveyed
13.33	-	3.0	Access Rd	AR-029
15.67	18.45	25.3	Pipeline corridor	~75 ft. width not surveyed
18.50	18.62	0.6	Pipeline corridor	~40 ft. width not surveyed
20.43	-	4.2	Access Rd	AR-032
21.75	22.42	4.1	Pipeline corridor	~50 ft. width not surveyed
23.20	26.00	16.7	Pipeline corridor	~50 ft. width not surveyed
24.97	25.40	4.1	Access Rd	AR-34A
26.20	26.27	1.5	Pipeline corridor	~200 ft. width not surveyed
28.00	29.57	2.9	Pipeline corridor	Narrow strip not surveyed
28.80	-	1.5	Access Rd	N end of AR-036
32.09	32.13	1.9	Pipeline corridor	Full survey corridor not surveyed
32.15	32.69	3.4	Access Rd	AR-038
32.29-32.40	32.69-32.74	17.9	Pipeline corridor	Full survey corridor not surveyed
34.72	34.76	0.3	Pipeline corridor	Small wedge-shaped parcel not surveyed
34.94	34.96	0.5	Pipeline corridor	Small quadrilateral parcel not surveyed
35.00	35.06	1.5	Pipeline corridor	Small quadrilateral parcel not surveyed
35.08	35.10	0.5	Pipeline corridor	Small quadrilateral parcel not surveyed
35.21	35.28	1.7	Pipeline corridor	Small quadrilateral parcel not surveyed
35.59-35.62	36.36-36.50	40.0	Pipeline corridor	Full survey corridor not surveyed

TABLE 4.9.2-3 PennEast Pipeline Segments Pending Surveys in Pennsylvania				
Begin MP	**End MP**	**Acres**	**Project Segment**	**Description**
36.85	37.10	1.1	Pipeline corridor	Narrow wedge-shaped parcel not surveyed
37.40	37.52	0.4	Pipeline corridor	Narrow wedge-shaped parcel not surveyed
37.98	40.50	12.2	Pipeline corridor	Narrow wedge-shaped parcel not surveyed
40.71	41.70	48.0	Pipeline corridor	Full survey corridor not surveyed
42.82	42.88	1.3	Work Area	Unidentified work area
43.56	43.95	2.6	Pipeline corridor	Narrow strip not surveyed
44.42	44.48	0.6	Pref. Alignment	Small wedge-shaped parcel not surveyed
44.59	44.95-45.06	17.9	Pref. Alignment	Full survey corridor not surveyed
45.40	45.50	4.1	Pipeline corridor	Full survey corridor not surveyed
45.60	45.66	0.5	Pref. Alignment	Small wedge-shaped parcel not surveyed
45.70	45.76	0.2	Pipeline corridor	Small wedge-shaped parcel not surveyed
45.73-45.83	46.45-46.47	33.0	Pipeline corridor	Full survey corridor not surveyed
46.72	46.80	0.7	Pipeline corridor	Small wedge-shaped parcel not surveyed
47.52	47.60	0.7	Pipeline corridor	Small wedge-shaped parcel not surveyed
48.13	48.17	1.9	Pipeline corridor	Full survey corridor not surveyed
48.62	48.90	2.1	Access Rd	E half of AR-049
48.90	48.92	0.2	Pipeline corridor	Small wedge-shaped parcel not surveyed
50.42	50.49	0.3	Pipeline corridor	Narrow strip not surveyed
50.90	51.02	2.6	Pipeline corridor	~200 ft. width not surveyed
50.94	50.98	0.1	Pipeline corridor	Narrow strip not surveyed
52.28	52.46	3.5	Pipeline corridor	Narrow strip not surveyed
52.77	52.93	7.8	Pipeline corridor	Full survey corridor not surveyed
53.49-53.58	54.07	25.9	Pipeline corridor	Full survey corridor not surveyed
54.30	54.72	20.4	Pipeline corridor	Full survey corridor not surveyed
54.76	54.82	2.9	Pipeline corridor	Full survey corridor not surveyed
54.84	55.09	9.5	Pipeline corridor	Irregular area up to full corridor width not surveyed
54.98	56.77	86.8	Pipeline corridor	Full survey corridor not surveyed
57.68	57.75	1.7	Pipeline corridor	~200 ft. width not surveyed
58.03-58.13	58.52-58.56	21.6	Pipeline corridor	Generally, full survey corridor not surveyed
58.73	58.88	0.6	Pipeline corridor	Narrow strip not surveyed
58.90	58.98	0.2	Pipeline corridor	Narrow strip not surveyed
60.26	60.29	1.4	Pipeline corridor	Wedge-shaped parcel not surveyed
61.60	62.00	27.8	Work Area	PE-C-05 (portion)
62.08-62.10	62.15-62.18	3.5	Pipeline corridor	Full survey corridor not surveyed
62.20	62.40	1.2	Pipeline corridor	Narrow strip not surveyed
62.48-62.52	62.68-62.70	9.1	Pipeline corridor	Small quadrilateral parcel not surveyed
62.76	62.79	1.5	Pipeline corridor	Full survey corridor not surveyed
63.66	63.71	0.8	Pipeline corridor	Irregular area up to half corridor width not surveyed
63.72-63.75	63.87	6.5	Pipeline corridor	Full survey corridor not surveyed

TABLE 4.9.2-3 PennEast Pipeline Segments Pending Surveys in Pennsylvania				
Begin MP	**End MP**	**Acres**	**Project Segment**	**Description**
63.95	64.30-64.34	9.0	Pipeline corridor	~200 ft. width not surveyed
64.32-64.36	64.57	7.0	Pipeline corridor	~250 ft. width not surveyed
64.57	64.96-65.02	20.4	Pipeline corridor	Full survey corridor not surveyed
64.70	-	93.5	Work Area	PE-C-04
65.41	65.80	16.2	Pipeline corridor	Irregular area up to full corridor width not surveyed
66.10-66.22	67.56	61.0	Pipeline corridor	Generally, full survey corridor not surveyed
67.66	67.84	8.7	Pipeline corridor	Full survey corridor not surveyed
68.50	68.87	9.0	Pipeline corridor	~200 ft. width not surveyed
68.97	69.71	17.9	Pipeline corridor	~200 ft. width not surveyed
70.50	-	38	Work Area	PE-D-06
70.90	71.04	6.8	Pipeline corridor	Full survey corridor not surveyed
0.10	0.33	7.0	Hellertown Lateral	~200 ft. width not surveyed
0.67	1.09	15.0	Hellertown Lateral	Irregular area up to full survey corridor not surveyed
71.91	72.0-72.07	5.8	Pipeline corridor	Full survey corridor not surveyed
72.10	72.52	16.7	Pipeline corridor	Full survey corridor not surveyed
72.80	72.92	0.9	Pipeline corridor	Wedge-shaped parcel not surveyed
73.02	73.08	0.4	Pipeline corridor	Wedge-shaped parcel not surveyed
73.13	73.23	1.8	Pipeline corridor	Wedge-shaped parcel not surveyed
73.58	74.37	34.8	Pipeline corridor	Full survey corridor not surveyed
74.94	75.01	1.7	Pipeline corridor	Small quadrilateral parcel not surveyed
76.64-76.66	76.88-76.92	12.1	Pipeline corridor	Full survey corridor not surveyed

Aboveground Resources

PennEast conducted background research for aboveground resources or historic architecture on properties located within 0.25 mile of the Project, the indirect APE (table 4.9.2-4). The Delaware Division of the Pennsylvania Canal, is listed as a NHL and is the longest-lived canal in the country. It is recognized both for its engineering and for its role in opening the anthracite coalfields of the Lehigh Valley to markets in Philadelphia and New York City during the early-to-mid-nineteenth century. The Lehigh Canal Easton Section is listed in the NRHP for its contribution to the growth of populations, communities, and industry in the Lehigh Valley and Philadelphia during the mid-nineteenth century. The Isaac Stout House, a Georgian-style home dating to the eighteenth century, is also listed in the NRHP. The Pennsylvania SHPO noted in its letter of October 21, 2015, that while the Stout home is not within the APE, the property on which it sits overlaps with the APE. Additional properties determined eligible to the NRHP include three farmsteads, the ANST, two railroad sections, and a transmission line.

The Pennsylvania SHPO noted that the Hickory Run Recreation Demonstration Area, located within the APE, is determined eligible to the NRHP. It is one of a number of Depression-era parks developed by the NPS during 1930–1940, using labor from the Civilian Conservation Corps and the Works Progress Administration. PennEast has not evaluated potential impact on the Hickory Run Recreation Demonstration Area or provided a recommendation of effects and Pennsylvania SHPO comments on the recommendation. Therefore, **we recommend that**:

- **Prior to construction, PennEast should assess potential Project impacts on the Hickory Run Recreation Demonstration Area and file with the Secretary, for review and written approval by the Director of the OEP, a recommendation of effects and the Pennsylvania SHPO's comments.**

PennEast's field reconnaissance survey documented historic architectural resources over 48 years of age in the indirect APE. Resources and PennEast's recommended eligibility to the NRHP are listed in table 4.9.2-4 (Zeoli and Hood 2015a). In a letter dated October 21, 2015, Pennsylvania SHPO concurred with the recommendations and requested PennEast to develop Historic Resource Survey Forms (HRSF) for these sites. Pennsylvania SHPO also requested a HRSF form to be completed for one additional resource, site NO-0053 (included in table 4.9.2-4), either for the noted individual barn or the entire related farmstead, depending upon the results of additional historical research. One resource previously documented and listed in the Pennsylvania SHPO site files (D. Bayer Farm, site 096315), was found to have been demolished.

PennEast has a number of evaluation studies/reports and potential treatment plans pending. PennEast would complete these activities and provide results to Pennsylvania SHPO and to the Commission. Table 4.9.2-4 lists some of these additional activities.

TABLE 4.9.2-4

Aboveground Resources Listed/Eligible to the NRHP or Requiring Additional Documentation Located within the Indirect APE in Pennsylvania

Resource No.	Name	PennEast Eligibility Recommendation	Additional Documentation/ Consultation
001661	Delaware Division of the Pennsylvania Canal	Listed in NRHP as NHL	Consult the Pennsylvania SHPO regarding effects
001016	Lehigh Canal Easton Section	NRHP Listed	Consult the Pennsylvania SHPO regarding effects
123914	Isaac Stout House	NRHP Listed	House outside of APE Tax Parcel upon which it sits appears within APE October 21, 2015
086688	Site No. 3: Farmhouse, Barn and Outbuildings	Eligible	Consult the Pennsylvania SHPO regarding effects
096307	Anthony Oberly Farm	Eligible	Consult the Pennsylvania SHPO regarding effects
143013	Christman Farm; Pichel Farm	Eligible	Consult the Pennsylvania SHPO regarding effects
144291	Appalachian Trail	Eligible	Consult the Pennsylvania SHPO regarding effects
156601	Pennsylvania-New Jersey (PNJ) Interconnection	Eligible	Consult the Pennsylvania SHPO regarding effects
157176	Fehnel Farm	Eligible	Consult the Pennsylvania SHPO regarding effects
102488	Lehigh and New England Railroad (Bethlehem to Chapmanboro)	Eligible	Consult the Pennsylvania SHPO regarding effects
201072	Hickory Run Recreation Demonstration Area	Eligible resource not reported by PennEast	Consult the Pennsylvania SHPO regarding effects October 21, 2015

TABLE 4.9.2-4 Aboveground Resources Listed/Eligible to the NRHP or Requiring Additional Documentation Located within the Indirect APE in Pennsylvania			
Resource No.	**Name**	**PennEast Eligibility Recommendation**	**Additional Documentation/ Consultation**
LU-0001	1360 Lower Demunds Road	Needs Additional Research Recommended Eligible	Request for HRSF a/ October 21, 2015
LU-0007	Payne-Pettebone House 763 Wyoming Avenue	Needs Additional Research Recommended Eligible	Request for HRSF October 21, 2015
CA-0090	600 Lonesome Land	Needs Additional Research Recommended Eligible	Request for HRSF October 21, 2015
CA-0200	Walk Farm/Lower Smith Gap Farm	Needs Additional Research Recommended Eligible	Request for HRSF October 21, 2015
NO-0028	2724 Whitetail Deer Drive	Needs Additional Research Recommended Eligible	Request for HRSF October 21, 2015
NO-0152	4167 Newburg Road	Needs Additional Research Recommended Eligible	Request for HRSF October 21, 2015
NO-0122	5217 William Penn Highway	Needs Additional Research Recommended Eligible	Concurrence October 21, 2015
LU-0002	1410 Lower Demunds Road	Needs Additional Research	Request for HRSF October 21, 2015
LU-0157	Port Blanchard Cemetery	Needs Additional Research	Request for HRSF October 21, 2015
NO-0225	Kleintop Farm 3262 West Scenic Drive	Needs Additional Research	Request for HRSF October 21, 2015
NO-0201	3228 Scenic Drive	Needs Additional Research	Request for HRSF October 21, 2015
NO-0202	3152 Bigley Road	Needs Additional Research	Request for HRSF October 21, 2015
NO-0030	2894 W. Beersville Road	Needs Additional Research	Request for HRSF October 21, 2015
NO-0029	2790 Whitetail Deer Drive	Needs Additional Research	Request for HRSF October 21, 2015
NO-0066	419 Chestnut Street	Needs Additional Research	Request for HRSF October 21, 2015
NO-0052	4190 Newburg Road	Needs Additional Research	Request for HRSF October 21, 2015
NO-0205	Gun Club Road	Recommended Not Eligible	Request for HRSF October 21, 2015
NO-0060	Blossom Hill 2880 Blossom Hill Road	Recommended Not Eligible	Request for HRSF October 21, 2015
NO-0222	659 Daniels Road	Recommended Not Eligible	Request for HRSF October 21, 2015
NO-0178	450 Buttermilk Road	Needs Additional Research	Request for HRSF October 21, 2015
NO-0177	4006 Sherry Hill Road	Needs Additional Research	Request for HRSF October 21, 2015
NO-0176	2387-2389 Ringhoffer Road	Needs Additional Research	Request for HRSF October 21, 2015
NO-0150	175 Dunham Road	Needs Additional Research	Request for HRSF October 21, 2015
NO-0149	615 Bougher Hill Road	Needs Additional Research	Request for HRSF October 21, 2015
NO-0096	645 Bougher Hill Road	Needs Additional Research	Request for HRSF October 21, 2015

TABLE 4.9.2-4 Aboveground Resources Listed/Eligible to the NRHP or Requiring Additional Documentation Located within the Indirect APE in Pennsylvania			
Resource No.	**Name**	**PennEast Eligibility Recommendation**	**Additional Documentation/ Consultation**
BU-0040	1215 Counter Line Road	Needs Additional Research	Request for HRSF October 21, 2015
BU-0039	803 Stoudts Valley Road	Needs Additional Research	Request for HRSF October 21, 2015
NO-0053	Nazareth-Bethlehem Pike near Lonat Drive	Not eligible	Request for HRSF pending additional research October 21, 2015

Note:
a/ HRSF = Historic Resource Survey Form

4.9.2.2 New Jersey

Archaeological Resources

PennEast has performed archaeological surveys of the Project APE. The results of the survey work that has been filed with the Commission is presented in the reports listed in Table 4.9.2-1.

PennEast performed archaeological surveys for 12.1 miles (approximately 587 acres) of the direct APE for the pipeline in New Jersey, or approximately 32 percent of the Project in New Jersey (Ziesing et al. 2015a and Ziesing et al. 2015b). A geomorphology study indicated that the pipeline crossing of the Delaware River may have alluvial deposits could contain deeply buried archaeological sites.

Archaeological surveys conducted by PennEast resulted in identification of six new archaeological sites, 28HU577, 28HU578, 28HU579, 28ME386, PE-ME27-S1, and PE-ME35-S1 (Ziesing et al. 2015a). One site was of an unknown prehistoric use and the others are associated with historic occupation. Site 28ME386 is a historic period archaeological site that is likely associated with the Joseph B. Blackwell Farm, a mid-to-late 19th century property determined eligible to the NRHP by the New Jersey SHPO in 1982. The archaeological components also have the potential to be eligible to the NRHP. PennEast recommended Site PE-ME35-S1, a historic artifact field scatter located within the Pleasant Valley Historic District, ineligible for the NRHP. PennEast recommended Site 28HU577 (a historic period quarry site), Site 28HU578 (a prehistoric lithic scatter), and Site 28HU579 (a multi-component site containing a historic period foundation and artifact scatter, and a prehistoric lithic scatter) as potentially eligible for listing on the NRHP. PennEast proposed avoidance strategies at 28HU5778, 28HU579, and the Joseph P. Blackwell Farm. Additionally, PennEast recommended site evaluations at 28HU577 and at PE-ME27-S1 located within the Pleasant Valley Historic District/Phillips Mill Site. The New Jersey SHPO noted concerns with the survey methodology, and in a revised archaeological survey report, PennEast provided clarification of the archaeological field methods (Zeisling et al. 2015b). The New Jersey SHPO accepted the revised survey report, but the New Jersey SHPO did not agree with the recommendations and requested additional consultation and additional studies.

PennEast has a number of survey reports, avoidance plans, evaluation studies and reports, and potential treatment plans pending. Table 4.9.2-5 lists some of these additional activities.

TABLE 4.9.2-5

Archaeological Resources with Pending Studies or Treatment in New Jersey

Site Number a/	Cultural Affiliation/ Site Type	PennEast Recommended NRHP Status	PennEast Recommended Action	New Jersey SHPO Comment
28HU577	Historic/Quarry	Potentially eligible	Conduct evaluation	Concurs with recommendation for evaluation but requests further consultation to develop appropriate testing program
28HU578	Prehistoric/Lithic Scatter	Potentially eligible	Avoidance (fencing and monitoring)	Does not concur with recommendations for avoidance and requests further consultation
28HU579	Historic/Foundation and artifact scatter; Prehistoric/Lithic Scatter	Potentially eligible	Avoidance (fencing and monitoring)	Requests further consultation to develop appropriate avoidance
28ME386	Historic/Joseph P. Blackwell Farm (New Jersey SHPO ID 1676)	Eligible; Archaeological component not evaluated, Potentially eligible	Avoidance (fencing and monitoring)	Requests further assessment of effects on the entire site
PE-ME27-S1	Historic/Refuse Dump within Pleasant Valley Historic District/ Phillips Mill Site	Listed; Archaeological component potentially eligible	Conduct evaluation	Site evaluation is not warranted
PE-ME35-S1	Historic/Field Scatter	Not Eligible	No further investigation or avoidance needed	Requests further consultation

Note:
a/ Temporary field numbers assigned by PennEast begin with PE. Resources with temporary field numbers do not meet the New Jersey State Museum criteria for a site and were not assigned a New Jersey site number.

Archaeological surveys have not been completed. Table 4.9.2-6 lists the areas, by MP, that have surveys pending.

TABLE 4.9.2-6

PennEast Pipeline Segments Surveys Pending in New Jersey

Begin MP	End MP	Acres	Element	Description
8	79.51-79.67	91.6	Pipeline Corridor	Full survey corridor not surveyed
0.19	0.60	19.9	Lateral	Holland Lateral
79.73-79.76	79.78-79.83	3.4	Pipeline Corridor	Full survey corridor not surveyed
79.88	80.13	12.1	Pipeline Corridor	Full survey corridor not surveyed
80.17-80.22	80.36-80.38	8.7	Pipeline Corridor	Full survey corridor not surveyed
80.52	80.57	2.4	Pipeline Corridor	Wedge not surveyed
80.49-80.53	80.56-80.65	3.1	Pipeline Corridor	Irregular area up to full corridor width not surveyed
80.65	80.84	2.6	Pipeline Corridor	Irregular strip not surveyed
80.84-80.92	81.03-81.06	8.8	Pipeline Corridor	Full survey corridor not surveyed
81.63	81.66	0.3	Pipeline Corridor	Wedge not surveyed
81.88	82.15	6.8	Pipeline Corridor	Irregular area up to nearly full corridor width not surveyed

TABLE 4.9.2-6 PennEast Pipeline Segments Surveys Pending in New Jersey				
Begin MP	**End MP**	**Acres**	**Element**	**Description**
81.14-81.18	83.19-83.25	99.1	Pipeline Corridor	Full survey corridor not surveyed
83.56-83.66	83.86-83.94	12.7	Pipeline Corridor	Irregular area up to full corridor width not surveyed
83.93-84.00	84.21	12.1	Pipeline Corridor	Full survey corridor not surveyed
84.21	84.41	6.3	Pipeline Corridor	~260 ft. width not surveyed
84.93	84.99	0.9	Pipeline Corridor	Small quadrilateral not surveyed
85.51-85.54	85.57-85.65	4.4	Pipeline Corridor	Irregular area up to full corridor width not surveyed
86.77-86.80	87.34-87.40	29.1	Pipeline Corridor	Full survey corridor not surveyed
87.77-87.93	90.62-90.64	135.0	Pipeline Corridor	Full survey corridor not surveyed
90.69-90.72	92.20	72.2	Pipeline Corridor	Full survey corridor not surveyed
92.51-92.57	96.83	187.3	Pipeline Corridor	Generally, full survey corridor not surveyed
94.00	94.40	48.4	Work Area	PE-E-06
96.83	100.38	172.1	Pipeline Corridor	Full survey corridor not surveyed
100.43	100.51	3.9	Pipeline Corridor	Full survey corridor not surveyed
0.03-0.06	0.11	3.6	Lateral	West Amwell Lateral
0.19	1.43	65.2	Lateral	West Amwell Lateral
101.00	101.24	11.6	Pipeline Corridor	Full survey corridor not surveyed
101.29-101.34	101.40-101.47	5.8	Pipeline Corridor	Full survey corridor not surveyed
101.23	101.50	8.9	Work Area	Unidentified work area
101.57-101.61	102.90-102.97	65.0	Pipeline Corridor	Full survey corridor not surveyed
103.01-103.04	103.16-103.17	4.1	Pipeline Corridor	Partial corridor width (~300) not surveyed
103.63	103.71	1.0	Pipeline Corridor	~100 ft. width not surveyed
103.80	-	0.1	Pipeline Corridor	Wedge not surveyed
103.83-103.95	104.39	24.2	Pipeline Corridor	Full survey corridor not surveyed
104.39	104.81-104.83	21.1	Pipeline Corridor	Full survey corridor not surveyed
104.88-104.92	105.24-105.26	16.7	Pipeline Corridor	Full survey corridor not surveyed
106.15-106.17	106.39-106.58	15.8	Pipeline Corridor	Full survey corridor not surveyed
106.63	106.77	2.6	Pipeline Corridor	Wedge not surveyed
107.75-107.77	108.93	53.2	Pipeline Corridor	Full survey corridor not surveyed
109.14	111.05	92.4	Pipeline Corridor	Full survey corridor not surveyed
111.29-111.40	111.82-111.89	24.7	Pipeline Corridor	Full survey corridor not surveyed
111.91-111.96	112.00	3.2	Pipeline Corridor	Generally, full survey corridor not surveyed
112.00	112.04	0.3	Pipeline Corridor	Wedge not surveyed
112.09-112.13	112.43-112.54	14.8	Pipeline Corridor	Generally, full survey corridor not surveyed
112.63	112.70	0.8	Pipeline Corridor	~100 ft. width not surveyed
112.67	112.89	6.7	Pipeline Corridor	~250 ft. width not surveyed
112.99	113.05	0.7	Pipeline Corridor	~100 ft. width not surveyed
113.20	-	0.1	Pipeline Corridor	Wedge not surveyed
113.27	113.33	1.5	Pipeline Corridor	~200 ft. width not surveyed
113.49	114.00	21.6	Pipeline Corridor	Full survey corridor not surveyed

Aboveground Resources

PennEast performed background research that indicated previously documented architectural resources within the APE. The Rosemont Rural Agricultural Historic District and the Pleasant Valley Historic District are listed on the NRHP and are comprised of well-preserved farmland and residences dating primarily to the eighteenth and nineteenth centuries. The Bunns Valley Agricultural Historic District, the Inch Lines Linear Mulststate Historic District, and the Delaware and Bound Brook Railroad Historic District are recommended as NRHP-eligible historic districts. The Oldis (Smith-Mershon) Farm and the Joseph P. Blackwell Farm are residential farm properties determined eligible to the NRHP and NJ Route 31 Circle (Pennington Circle) is a transportation resource determined eligible to the NRHP. PennEast completed its survey of the NJ Route 31 Circle and the Joseph P. Blackwell Farm, and will complete its surveys of the other NRHP-listed and –eligible resources.

PennEast also conducted surveys for historic architectural resources within the indirect APE in New Jersey (Zeoli and Hood 2015b). Resources identified and recommended NRHP-eligibility are listed in table 4.9.2-7. The Joseph P. Blackwell Farm was re-surveyed by PennEast since it was previously documented ten years ago. As requested by New Jersey SHPO, PennEast would perform intensive-level architectural surveys of 18 resources. PennEast did not provide recommendations of effects to the NRHP-eligible or NRHP-listed properties or address potential mitigation, if necessary.

PennEast has a number of evaluation studies/reports and potential treatment plans pending. Table 4.9.2-7 lists some of these additional activities.

TABLE 4.9.2-7

Aboveground Resources Listed/Eligible to the NRHP or Requiring Additional Documentation Located within the Indirect APE in New Jersey

Temporary Survey Code	Name	PennEast NRHP Eligibility Recommendation	New Jersey SHPO Comment
ME-0218	Joseph B. Blackwell Farm 135 Blackwell Road Hopewell Township	Re-surveyed by PennEast Eligible [SHPO opinion – 6/23/1982]	Concur -10/23/2015 Perform intensive-level architectural survey
4275	Bunns Valley Agricultural Historic District	Eligible [SHPO opinion – 5/3/2004]	Noted – 10/23/2015
4591	Rosemont Rural Agricultural Historic District	Listed [Listed 6/8/2010]	Noted – 10/23/2015
1914	Inch Lines Linear Multistate Historic District	Eligible [SHPO opinion – 8/31/1993]	Noted – 10/23/2015
1698	Pleasant Valley Historic District	Listed [Listed 6/14/1991]	Noted – 10/23/2015
4570	Oldis (Smith-Mershon) Farm	Eligible [SHPO opinion – 5/17/2004]	Noted – 10/23/2015
4540	Delaware & Bound Brook Railroad Historic District	Eligible [SHPO opinion - 9/9/2005]	Noted – 10/23/2015

TABLE 4.9.2-7 Aboveground Resources Listed/Eligible to the NRHP or Requiring Additional Documentation Located within the Indirect APE in New Jersey			
Temporary Survey Code	**Name**	**PennEast NRHP Eligibility Recommendation**	**New Jersey SHPO Comment**
4993	NJ Route 31 Circle (Pennington Circle)	Eligible [SHPO opinion – 9/21/2010]	Noted – 10/23/2015
HU-0070	John Moore Farmhouse 83 Old River Road Holland Township	Potentially NRHP-Eligible	Concur -10/23/2015 Perform intensive-level architectural survey
HU-0148	Barker Tract 234 Riegelsville Road Holland Township	Potentially NRHP-Eligible	Concur -10/23/2015 Perform intensive-level architectural survey
HU-0195	445 Miller Park Road Holland Township	Potentially NRHP-Eligible	Concur -10/23/2015 Perform intensive-level architectural survey
HU-0075	369 Stamets Road Holland Township	Potentially NRHP-Eligible	Concur -10/23/2015 Perform intensive-level architectural survey
HU-0094	32 Kappus Road Alexandria Township	Potentially NRHP-Eligible	Concur -10/23/2015 Perform intensive-level architectural survey
HU-0093	130 County Road 513 Alexandria Township	Potentially NRHP-Eligible	Concur -10/23/2015 Perform intensive-level architectural survey
HU-0147	97 Horseshoe Road Kingwood Township	Potentially NRHP-Eligible	Concur -10/23/2015 Perform intensive-level architectural survey
HU-0210	155 Lower Creek Road Delaware Township	Potentially NRHP-Eligible	Concur -10/23/2015 Perform intensive-level architectural survey
HU-0191	Black River & Western Railroad, West Amwell Township	Potentially NRHP-Eligible	Concur -10/23/2015 Perform intensive-level architectural survey
HU-0221	Rock Road/Rocktown Road/The Road Along the Rocks, West Amwell Township	Potentially NRHP-Eligible	Concur -10/23/2015 Perform intensive-level architectural survey
ME-0172	87 Valley Road Hopewell Township	Potentially NRHP-Eligible	Concur -10/23/2015 Perform intensive-level architectural survey
ME-0190	349 Penn Titusville Road Hopewell Township	Potentially NRHP-Eligible	Concur -10/23/2015 Perform intensive-level architectural survey
ME-0181	1653 Reed Road Hopewell Township	Potentially NRHP-Eligible	Concur -10/23/2015 Perform intensive-level architectural survey
HU-0194	504 Milford-Mount Pleasant Road Holland Township	Not Eligible No further work	Disagrees – 10/23/2015 Requests intensive-level survey
HU-0184	173 Horseshoe Bend Road Kingwood Township	Not Eligible No further work	Disagrees – 10/23/2015 Requests intensive-level survey
HU-0207	James Lambert House 1465 Route 179 West Amwell Township	Not Eligible No further work	Disagrees – 10/23/2015 Requests intensive-level survey
HU-0208	108 Old Route 518 East West Amwell Township	Not Eligible No further work	Disagrees – 10/23/2015 Requests intensive-level survey

4.9.3 Outstanding Cultural Resource Investigations

PennEast has not completed all cultural resources field investigations, provided reports, or completed consultation for the Project. Many areas to be surveyed are within locations where landowner permission for survey has not been granted to PennEast.

Pennsylvania

There are approximately 1,032 acres in Pennsylvania that still require archaeological surveys. The locations are described in table 4.9.3-1.

TABLE 4.9.3-1

PennEast Archaeological Survey -- Estimated Area Survey Pending (in Acres)

State/County	Access Road	Lateral	Pipeline Corridor	Pipeline Corridor / Access Road	Work Area	Work Area / Access Road	Grand Total
Pennsylvania							
Bucks	-	-	12.1	-	-	-	12.1
Carbon	11.1	-	212.6	-	1.3	-	213.9
Luzerne	9.5	-	158.7	11.4	14.1	17.5	201.6
Northampton	-	22.0	422.9	-	159.3	-	604.2
Subtotal, Pennsylvania	**20.7**	**22.0**	**806.2**	**11.4**	**174.7**	**17.5**	**1,031.8**

Sources: Wyatt et al. (2015: Figures 1.43-1.44); Wyatt et al. (2016: Figures 1.1-1.53);

Additionally, there are 148 parcels in Pennsylvania that still require aboveground resources/historic architecture surveys.

New Jersey

There are approximately 2,441 acres in New Jersey that still require archaeological investigations and 141 parcel of land that require above ground resources surveys. The locations are described in table 4.9.3-2.

TABLE 4.9.3-2

PennEast Archaeological Survey -- Estimated Area Survey Pending (in Acres)

State/County	Access Road	Lateral	Pipeline Corridor	Pipeline Corridor / Access Road	Work Area	Work Area / Access Road	Grand Total
New Jersey							
Hunterdon	-	88.7	986.8	-	57.3	-	*1,132.8*
Mercer	-	-	276.1	-	-	-	*276.1*
Subtotal, New Jersey	**0.0**	**88.7**	**1,262.8**	**0.0**	**57.3**	**0.0**	**1,408.8**
Grand Total	**20.7**	**110.7**	**2,069.0**	**11.4**	**232.0**	**17.5**	**2,440.6**

Source: Ziesing et al. (2015: Figures 3.1.1-3.1.21).

4.9.4 Unanticipated Discoveries Procedures

PennEast developed Unanticipated Discovery Plans for Pennsylvania and New Jersey. The New Jersey SHPO and FERC provided comments on the plans and requested revisions. PennEast filed revised the plans and added language related to those who would be contacted in the event of an unanticipated discovery. The revised plan was filed with us on December 14, 2015 and we find the plans acceptable.

4.9.5 General Impact and Mitigation

FERC, in consultation with the Pennsylvania and New Jersey SHPOs, would determine if the Project would result in adverse effects to significant resources. If it is determined that adverse effects to historic properties would result from the Project, PennEast would be required to develop avoidance plans and treatment plans along with Memoranda of Agreements. PennEast proposes to control and monitor construction activities in immediate proximity of historic aboveground resources by denoting these on construction alignment sheets as environmentally sensitive areas to be avoided, installing high visibility fencing, and employing an on-site monitor to assure site avoidance during construction in selected areas.

For aboveground resources that are immediately adjacent to construction activities, vibration is expected to have limited effects. PennEast states that a vibration monitoring plan may be required to avoid adverse effects. This would require EIs to assess the condition of the historic buildings and monitor the effects of vibration when ground-disturbing activities (including clearing, grading, trenching, and restoration) would occur near a historic property, through photography and daily inspection logs before, during, and after construction. There are several historic properties with contributing buildings or structures within 150 feet of the proposed pipeline centerline which may require further evaluation during the effects analysis phase. PennEast states that if the effects analysis determines the property has the potential to be adversely affected by vibration, it would work with the Pennsylvania and New Jersey SHPOs to develop and implement a vibration monitoring plan; therefore, **we recommend that:**

- **<u>Prior to construction</u>, PennEast should file with the Secretary, for review and written approval by the Director of the OEP, a final vibration monitoring plan for historic properties within 150 feet of the construction workspace in consultation with the Pennsylvania and New Jersey SHPOs.**

PennEast has prepared a Blasting Plan which provides for pre-blast and post-blast inspection of structures located within 150 feet of the proposed construction right-of-way. However, the Blasting Plan does not include potential affects to cultural and architectural resources, therefore, **we recommend that:**

- **<u>Prior to construction</u>, PennEast should file with the Secretary, for review and written approval by the Director of the OEP, a revised Blasting Plan that includes a review of potential effects on cultural resources, including caves, rockshelters, and aboveground historic structures, and how those impacts would be addressed.**

4.9.6 Compliance with NHPA

Compliance with section 106 of the NHPA has not been completed for the Project. PennEast still needs to complete surveys and evaluation for archaeological sites and historic architecture for the Project. To ensure the FERC's responsibilities under the NHPA and its implementing regulations are met, **we recommend that:**

- **PennEast <u>should not begin construction</u> of facilities and/or use of all staging, storage, or temporary work areas, and new or to-be-improved access roads <u>until</u>:**
  - **PennEast files with the Secretary:**
    - **remaining cultural resources survey report(s);**
    - **site or resource evaluation report(s) and avoidance/treatment plan(s), as required;**
    - **the Project's recommended effects to historic properties in Pennsylvania and New Jersey; and**
    - **comments on the cultural resources reports and plans from the Pennsylvania and New Jersey SHPOs, as appropriate.**
  - **the Advisory Council on Historic Preservation is afforded an opportunity to comment if historic properties would be adversely affected; and**
  - **the FERC staff reviews and the Director of the OEP approves the cultural resources reports and plans, and notifies PennEast in writing that treatment plans/mitigation measures (including archaeological data recovery) may be implemented and/or construction may proceed.**
- **All materials filed with the Commission containing location, character, and ownership information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: "CONTAINS PRIVILEGED INFORMATION - DO NOT RELEASE."**

4.10 AIR QUALITY AND NOISE

4.10.1 Air Quality

Air quality would be affected by construction and operation of the PennEast Pipeline Project. Air emissions would be generated both during construction of the Project components and associated facilities, and during long-term operation of the Project. This section of the EIS addresses existing air quality in the Project area, applicable regulatory requirements for air quality, and projected impacts on air quality from the construction and operation of the Project. The following facilities would generate construction and operational emissions at the proposed Project:

Kidder Compressor Station

- three natural gas turbine-driven Solar Mars 100 units rated at 15,900 hp each under ISO conditions (47,700 total ISO hp);
- one new natural gas-fired Caterpillar G3516 LE auxiliary power unit, rated at 1,462 hp;
- one 1,950 gallon storage tank (for pipeline liquids collected in the gas filter);
- various small storage vessels (for waste liquids, lubricating oil, etc.); and
- one fuel gas heater rated at approximately 3.22 million British thermal units per hour (MMBtu/hr) heat input.

Interconnect Stations

- natural gas line heaters:
  - one rated at 0.2 MMBtu/hr at the Blue Mountain Interconnect in Carbon County, Pennsylvania;
  - two each rated at 6.7 MMBtu/hr at the UGI-LEH and TCO Interconnects in Pennsylvania;
  - two rated at 6.6 to 6.7 MMBtu/hr at the Gilbert and Etown Interconnects in NJ;
  - three nominally rated at 40, 32, and 49 MMBtu/hr in NJ at the Algonquin, TETCO, and Transco Interconnects, respectively; and
  - one 1,000 gallon storage tank (for pipeline liquids collected in the gas filters) is proposed for each interconnect location.

Installation of the emission sources at the Kidder Compressor Station would require an air quality preconstruction permit from the Pennsylvania Department of Environmental Protection (PADEP).[20] The natural gas line heaters in Pennsylvania and New Jersey would require general permits from PADEP and from the New Jersey Department of Environmental Protection (NJDEP), respectively. These permitting requirements are discussed further in section 4.10.1.3.

4.10.1.1 Regional Climate

The Project facilities would be located in southeastern Pennsylvania and western New Jersey, which are classified as having a humid continental climate with hot summers (Köppen-Geiger climate classification *Dfa*) (NOAA 2015a).

Climate data were obtained from the Northeast Regional Climate Center (NRCC), for measurements taken either at Wilkes-Barre International Airport, or at Avoca, Pennsylvania, just

[20] As of June 13, 2016, PennEast has not yet submitted an air quality preconstruction permit application to PADEP.

west of Wilkes-Barre. These sites are relatively close to the proposed Kidder Compressor Station. The annual mean temperature is 49.3 °F, with a maximum daily mean of 71.4 °F in July, and a minimum daily mean of 25.8 °F in January. The normal daily maximum temperature is 58.7 °F, with a highest normal daily maximum of 81.9 °F in July, and a lowest normal daily maximum of 33.2 °F in January. The normal daily minimum temperature is 40.1 °F, with a highest normal daily minimum of 60.9 °F in July, and a lowest normal daily minimum of 18.5 °F in January. Maximum daily temperatures above 90 °F occur on average 7 days per year, and minimum daily temperatures below 32 °F occur on average 126 days per year.

Mean annual precipitation is 38.26 inches, evenly distributed throughout the year, and mean annual snowfall is 48.3 inches, occurring primarily in December through March. Maximum daily values for relative humidity can exceed 80 percent in the summer months. The average annual wind speed is 8.0 mph, predominantly from the west (NRCC 2015).

4.10.1.2 Existing Air Quality

The EPA has established National Ambient Air Quality Standards (NAAQS) for six pollutants: sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), particulate matter (PM) including PM less than 10 microns in diameter (PM_{10}) and PM less than 2.5 microns in diameter ($PM_{2.5}$), and lead.[21] There are two classifications of NAAQS, primary and secondary standards. Primary standards set limits the EPA believes are necessary to protect human health including sensitive populations such as children, the elderly, and asthmatics. Secondary standards are set to protect public welfare from detriments such as reduced visibility and damage to crops, vegetation, animals, and buildings.

In addition to the national standards, the states of Pennsylvania and New Jersey have established their own more stringent standards for certain pollutants. Table 4.10.1-1 presents the additional standards for Pennsylvania, and table 4.10.1-2 presents the additional standards for New Jersey.

TABLE 4.10.1-1

Pennsylvania Ambient Air Quality Standards a/

Pollutant	Averaging Period	State AAQS
Settled particulate (total)	Annual	0.8 mg/cm^2/month
	30-day	1.5 mg/cm^2/month
Beryllium	30-day	0.01 μg/m^3
Fluorides (total soluble, as HF)	24-hour	5 μg/m^3
Hydrogen Sulfide	24-hour	0.05 ppm
	1-hour	0.1 ppm

Note:
mg/cm^2/month = milligrams per square centimeter per month, ppm = parts per million, μg/m^3 = micrograms per cubic meter
a/ Maximum values that may not be exceeded.

[21] https://www.epa.gov/criteria-air-pollutants/naaqs-table

TABLE 4.10.1-2

New Jersey Ambient Air Quality Standards

Pollutant	Averaging Period	State AAQS	
		Primary	Secondary
Sulfur Dioxide	Annual a/	80 μg/m^3 (0.03 ppm)	60 μg/m^3 (0.02 ppm)
	24-hour b/	365 μg/m^3 (0.14 ppm)	260 μg/m^3 (0.1 ppm)
	3-hour b/	--	1,300 μg/m^3 (0.5 ppm)
Suspended particulate matter	Annual c/	75 μg/m^3	60 μg/m^3
	24-hour b/	260 μg/m^3	150 μg/m^3
Nitrogen Dioxide	Annual a/	100 μg/m^3 (0.05 ppm)	same
Carbon Monoxide	8-hour b/	10 mg/m^3 (9 ppm)	Same
	1-hour b/	40 mg/m^3 (35 ppm)	Same
Ozone	1-hour	0.12 ppm (235 μg/m^3) d/	0.08 ppm (160 μg/m^3) e/
Lead	Rolling 3-month average f/	1.5 μg/m^3	same

Notes:
ppm = parts per million, mg/m3 = milligrams per cubic meter, μg/m^3 = micrograms per cubic meter
a/ Arithmetic mean, not to be exceeded during any 12 consecutive months.
b/ Not to be exceeded more than once during any 12 consecutive months.
c/ Geometric mean of all 24-hour averages, not to be exceeded during any 12 consecutive months.
d/ Daily maximum one-hour average, not to be exceeded more than once during any 12 consecutive months.
e/ One-hour average, not to be exceeded more than once during any 12 consecutive months.
f/ Arithmetic mean of 24-hour averages, not to be exceeded during any 3 consecutive months.

Air Quality Control Regions (AQCRs) are areas established for air quality planning purposes in which implementation plans describe how ambient air quality standards will be achieved and maintained. AQCRs were established by the EPA and local agencies, in accordance with Section 107 of the CAA and its amendments, as a means to implement the CAA and comply with the NAAQS through state implementation plans (SIPs). The AQCRs are intrastate and interstate regions such as large metropolitan areas where the improvement of the air quality in one portion of the AQCR requires emission reductions throughout the AQCR.

An AQCR, or portion thereof, is designated based on compliance with the NAAQS. AQCR designations fall under three general categories as follows: attainment (areas in compliance with the NAAQS); nonattainment (areas not in compliance with the NAAQS); or unclassifiable. AQCRs that were previously designated nonattainment, but have since met the requirements to be classified as attainment are classified as maintenance areas. Table 4.10.1-3 presents the AQCRs in which various components of the Project would be located, along with the current attainment status listed in 40 CFR 81 for each pollutant. As shown, the areas in which the Project would be located are in attainment for all pollutants except ozone. Two AQCRs, in northeastern Pennsylvania and in the metropolitan Philadelphia region, were also previously in nonattainment for $PM_{2.5}$, but were redesignated as attainment in 2015.

TABLE 4.10.1-3 Attainment Status for Project Sites				
Project Component	**Location (Town/County)**	**AQCR**	**Attainment/ Unclassifiable**	**Nonattainment**
Pipeline Spread 1 (complete) Pipeline Spread 2 (partial)	Luzerne, PA –Dallas, West Wyoming, Wyoming, Laflin, Jenkins, Bear Creek, Plains, Kingston	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	CO, NO_X, Pb, PM_{10}, $PM_{2.5}$, SO_2	None a/
Pipeline Spread 2 Kidder Compressor Station Pipeline Spread 2 (partial)	Carbon, PA –Kidder, Penn Forest, Towamensing, Lower Towamensing	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	CO, NO_X, Pb, PM_{10}, $PM_{2.5}$, SO_2	Marginal for O_3 2008
Pipeline Spread 2 (partial) Pipeline Spread 3 (partial)	Northampton, PA –Lehigh, Moore, Upper Nazareth, Lower Nazareth, East Allen, Bethlehem, Lower Saucon, Williams	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	CO, NO_X, Pb, PM_{10}, $PM_{2.5}$, SO_2 Maintenance area for $PM_{2.5}$ 2006 b/	Marginal for O_3 2008
Pipeline Spread 3 (partial)	Bucks, PA –Durham, Riegelsville	Metropolitan Philadelphia Interstate Air Quality Control Region (PA-NJ-Delaware)	CO, NO_X, Pb, PM_{10}, $PM_{2.5}$, SO_2	Marginal for O_3 2008
Pipeline Spread 3 (partial) Pipeline Spread 4 (partial)	Hunterdon, NJ –Holland, Alexandria, Kingwood, Delaware, West Amwell	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	CO, NO_X, Pb, PM_{10}, $PM_{2.5}$, SO_2 Maintenance area for 1997 and 2006 $PM_{2.5}$ c/	Marginal for O_3 2008
Pipeline Spread 4 (partial)	Mercer, NJ – Hopewell	Metropolitan Philadelphia Interstate Air Quality Control Region (PA-NJ-Delaware)	CO, NO_X, Pb, PM_{10}, $PM_{2.5}$, SO_2	Marginal for O_3 2008

Notes
NO_x = nitrogen oxides, Pb = lead
a/ For new source review (NSR) purposes, all Project sites and counties in PA and NJ are subject to moderate ozone non-attainment as both states are within the Ozone Transport Region (OTR).
b/ Northampton County, PA was previously designated as moderate nonattainment for the 2006 24-hour PM2.5 standard, but was redesignated as attainment on April 13, 2015.
c/ Bucks County, PA was previously designated as moderate nonattainment for the 1997 annual and 24-hour PM2.5 standards, but was redesignated as attainment for both standards on April 21, 2015.

Greenhouse Gases

GHGs occur in the atmosphere both naturally and as a result of human activities, such as the burning of fossil fuels. These gases are the integral components of the atmosphere’s greenhouse effect that warms the earth’s surface and moderates day/night temperature variation. In general, the most abundant GHGs are water vapor, CO2, methane (CH4), nitrous oxide (N2O), and ozone.

The EPA has defined air pollution to include the mix of six long-lived and directly emitted GHGs (CO2, CH4, N2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride). The EPA found that the current and projected concentrations of the six GHGs in the atmosphere threaten the public health and welfare of current and future generations through climate change.

As with any fossil fuel-fired project or activity, the Project would contribute to GHG emissions. The principle GHGs that would be produced by the Project are CO2, CH4, and N2O. Emissions of GHGs are quantified and regulated in units of carbon dioxide equivalents (CO2e). The CO2e unit of measure takes into account the global warming potential (GWP) of each GHG over a specified timeframe. The GWP is a ratio relative to CO2 that is based on the particular

GHG's ability to absorb solar radiation as well its residence time within the atmosphere. Thus, CO2 has a GWP of 1, CH4 has a GWP of 25, and N_2O has a GWP of 298 on a 100-year timescale. To obtain the CO2e quantity, the mass of the particular compound is multiplied by the corresponding GWP, the product of which is the CO2e for that compound. The CO2e value for each of the GHG compounds is summed to obtain the total CO2e GHG emissions.

The EPA has expanded its regulations to include the emission of GHGs from major stationary sources under the Prevention of Significant Deterioration (PSD) program. The EPA's current rules require that a stationary source that is major for a non-GHG-regulated New Source Review (NSR) pollutant must also obtain a GHG PSD permit prior to beginning construction of a new or modified major source with mass-based GHG emissions equal to or greater than 100,000 tons per year (tpy) and significant net emission increases in units of CO_{2e} equal to or greater than 75,000 tpy. There are no NAAQS or other significance thresholds for GHGs.

4.10.1.3 Regulatory Requirements for Air Quality

The Project would be potentially subject to a variety of federal and state regulations pertaining to the construction or operation of air emission sources. The following sections summarize the applicability of various state and federal regulations.

Federal Air Quality Requirements

The CAA, 42 USC 7401 et seq., as amended in 1977 and 1990, and 40 CFR Parts 50 through 99 are the basic federal statutes and regulations governing air pollution in the U.S. The following federal requirements have been reviewed for applicability to the Project.

- NSR / Prevention of Significant Deterioration;
- Title V Operating Permits;
- New Source Performance Standards (NSPS);
- National Emission Standards for Hazardous Air Pollutants (NESHAP);
- Greenhouse Gas Reporting;
- Chemical Accident Prevention Provisions; and
- General Conformity.

New Source Review/Prevention of Significant Deterioration

Separate preconstruction review procedures for major new sources of air pollution (and major modifications of major sources) have been established for projects that are proposed to be built in attainment areas versus nonattainment areas. The preconstruction permit program for new or modified major sources located in attainment areas is called PSD. This review process is intended to keep new air emission sources from causing existing air quality to deteriorate beyond acceptable levels codified in the federal regulations. Construction of major new stationary sources in nonattainment areas must be reviewed in accordance with the nonattainment NSR regulations, which contain stricter thresholds and requirements.

The PSD rule defines a major stationary source as any source with a potential to emit (PTE) of 100 tpy or more of any criteria pollutant for source categories listed in 40 CFR §52.21(b)(1)(i) or 250 tpy or more of any criteria pollutant for source categories that are not listed. In addition, with respect to greenhouse gases (GHG), the major source threshold is 100,000 tpy, measured as carbon dioxide equivalents (CO_2e). If a new source is determined to be a major source for any PSD pollutant, then other remaining criteria pollutants would be subject to PSD review if those pollutants are emitted at rates that exceed significant emission thresholds, which are: 100 tpy for CO; 40 tpy each for nitrogen oxides (NO_x), volatile organic compound (VOC), and SO_2; 25 tpy for total suspended particulate, 15 tpy for PM_{10}, and 10 tpy for direct emissions of $PM_{2.5}$. Sources which exceed the major source threshold are then subject to a PSD review.

Estimated emissions from the proposed Kidder Compressor Station are below all PSD thresholds except for GHG. However, the requirements of PSD are not triggered if GHG is the only pollutant above the PSD threshold. Estimated emissions for the interconnect stations and fugitive pipeline emission sources are below PSD thresholds for all pollutants.

One additional factor considered in the PSD permit review process is the potential impacts on protected Class I areas. Class I areas were designated specifically as pristine natural areas of areas of natural significance and have the lowest increment of permissible deterioration, which precludes development near these areas. Class I areas are given special protection under the PSD program. The nearest Mandatory Class I Federal Area is the Brigantine Wilderness Area, which is located approximately 125 miles to the southeast from the Kidder Compressor Station. Because of the distance, a Class I analysis would not be required for the Project.

Title V Operating Permits

Title V of the CAA requires states to establish an air quality operating permit program. The requirements of Title V are outlined in the federal regulations in 40 CFR Part 70 and in 30 TAC §122. The operating permits required by these regulations are often referred to as Title V or Part 70 permits.

Projects that are considered major sources (i.e., sources with a PTE greater than a major source threshold level) are required to obtain a Title V operating permit. Title V major source threshold levels are 100 tpy for NO_x, CO, VOC, SO_2, PM_{10}, or $PM_{2.5}$, 10 tpy for an individual hazardous air pollutant (HAP), or 25 tpy for any combination of HAPs. Some of these thresholds can be lower in designated nonattainment areas or ozone transport regions. EPA had previously issued a Title V GHG "Tailoring Rule" that also made facilities subject to Title V permitting if their potential GHG emissions would equal or exceed 100,000 tpy CO2e. However, the U.S. Supreme Court vacated this requirement in its June 23, 2014 ruling in Utility Air Regulatory Group v. EPA, 134 S.Ct. 2427 (2014). Therefore, even though the GHG emissions exceed the 100,000 tpy threshold for the Kidder Compressor Station it would not be subject to the Title V Tailoring Rule.

Estimated emissions from the proposed Kidder Compressor Station are below all Title V thresholds, except GHGs. Estimated emissions for the interconnect stations and fugitive pipeline emission sources are below Title V thresholds for all pollutants.

New Source Performance Standards

NSPS regulations (40 CFR Part 60) establish pollutant emission limits and monitoring, reporting, and recordkeeping requirements for various emission sources based on source type and size. These regulations apply to new, modified, or reconstructed sources. The following NSPS requirements were identified as potentially applicable to the emission sources at the Kidder Compressor Station and Interconnect Stations.

Subpart KKKK of 40 CFR Part 60, Standards of Performance for Stationary Combustion Turbines, applies to stationary combustion turbines that are modified, constructed, or reconstructed after February 18, 2005 and have maximum heat input rates greater than 10 MMBtu per hour. Turbines subject to this subpart are exempt from 40 CFR Part 60, Subpart GG emission standards for turbines. Subpart KKKK applies to the Solar Mars 100 Turbines at the Kidder Compressor Station, which would each be rated at approximately 117.6 MMBtu/hr. Subpart KKKK regulates emissions of SO_2 and NO_x. One method of complying with the SO_2 emission limit is to not burn any fuel in the turbine which contains total potential sulfur emissions in excess of 26 nanograms SO_2 per joule, or 0.060 lb SO_2 per MMBtu, of heat input. The proposed Solar turbines would be fueled by natural gas or boil-off gas and therefore would comply with the fuel sulfur content requirement. Based on the size of the turbines, NO_x emissions must be limited to 25 parts per million by volume at 15 percent oxygen, or 1.2 lb per megawatt-hour.

The proposed Solar turbines would be equipped with the SoLoNOx™ dry low emission combustion system, which uses a lean, premixed air/fuel mixture to reduce peak combustion temperatures and control NO_x emissions. The dry low emission system is effective at steady state turbine loads from approximately 50 percent to 100 percent of full load and ambient air inlet temperatures above 0°F. Compliance with the NO_x emission limit would be demonstrated through performance tests as required under 40 CFR 60.4340. Compliance with the SO_2 limit would be demonstrated through the use of pipeline quality natural gas per 40 CFR 60.4365(a).

Subpart Kb of 40 CFR Part 60, Standards of Performance for Volatile Organic Liquid Storage Vessels, applies to storage vessels containing volatile organic liquids. Regulatory applicability is dependent on the construction date, size, vapor pressure, and contents of the storage vessel. Subpart Kb applies to new tanks, unless otherwise exempted, that have a storage capacity between 75 cubic meters (m^3) (19,813 gallons) and 151 m^3 (39,890 gallons) and contain VOCs with a maximum true vapor pressure greater than or equal to 15.0 kilopascals (kPa). Subpart Kb also applies to tanks that have a storage capacity greater than or equal to 151 m^3 and contain VOCs with a maximum true vapor pressure greater than or equal to 3.5 kPa. Each of the proposed storage tanks for the Project has a capacity of 1,950 gallons or less, and Subpart Kb therefore is not applicable.

Subpart JJJJ of 40 CFR Part 60, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines, applies to spark ignition engines with a maximum engine power greater than 25 hp for which construction commenced by July 12, 2006 and was manufactured after January 1, 2009. The 1,462-hp natural gas-fired engine at the Kidder Compressor Station would meet these applicability criteria and would therefore be subject to the requirements of Subpart JJJJ. In order to demonstrate compliance with the emission limits found in the rule, owners and operators may either operate a manufacturer-certified engine according to manufacturer's operation and maintenance procedures or conduct performance testing. Owners and operators of emergency engines are required to keep hours of operation records. Additionally, maintenance records must be kept for all engines.

Subpart OOOO of 40 CFR Part 60, Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution, applies to certain facilities that commence construction after August 23, 2011, and establishes emission standards for control of VOCs and SO_2. Subpart OOOO applies to natural gas wells and certain other equipment located between the wellhead and the custody transfer point, some examples of which include: centrifugal compressors using wet seals; reciprocal compressors; continuous bleed natural gas-driven pneumatic controllers; and storage vessels with potential VOC emissions greater than 6 tons per year. None of the proposed Project facilities fall into any of the equipment categories subject to Subpart OOOO. Although the Kidder Compressor Station would use centrifugal compressors, they would be equipped with dry seals, which are exempt from Subpart OOOO. In addition, PennEast has simulated operation of the pipeline liquids storage tanks and interconnect gas filters using AspenTech® HYSYS Version 8.4 process simulation software. This simulation indicates that no liquids are expect to condense out of the pipeline gas, and that storage tank VOC emissions would therefore be negligible.

The Subpart OOOO NSPS rules were revised and amended in August 2015. The final rule came into effect on August 12, 2015 and pertains to the definitions of "low pressure gas well" and "storage vessel." The revision to the definition of storage vessel (storage tank) does not have any effect on the project's proposed project pipeline liquids tanks. The revised definition specifically pertains to storage vessels connected or installed in parallel or returned to service or replaced. None of these scenarios apply to the proposed storage tanks and the revised NSPS does not apply to the Project emission sources.

National Emission Standards for Hazardous Air Pollutants

The NESHAP codified in 40 CFR Parts 61 and 63, regulate HAP emissions. Part 61 was promulgated prior to the 1990 Clean Air Act Amendments (CAAA) and regulates specific HAPs such as asbestos, benzene, beryllium, coke oven emissions, inorganic arsenic, mercury, radionuclides, and vinyl chloride.

The 1990 CAAA established a list of 189 HAPs, while directing EPA to publish categories of major sources and area sources of these HAPs, for which emission standards were to be promulgated according to a schedule outlined in the CAAA. These standards, also known as the Maximum Achievable Control Technology standards, were promulgated under Part 63. The 1990 CAAA defines a major source of HAPs as any source that has a PTE of 10 tpy for any single HAP or 25 tpy for all HAPs in aggregate. Area sources are stationary sources that do not exceed the thresholds for major source designation.

The Kidder Compressor Station would be an area source of HAP, with total potential HAP emission of less than 10 tpy. The interconnect stations would also be HAP area sources, with potential HAP emissions of less than one ton per year. The NESHAP described in the following paragraphs have been identified as being potentially applicable to specific Project sources.

Subpart YYYY of 40 CFR Part 63, NESHAP for Stationary Combustion Turbines, applies to owners and operators of stationary combustion turbines located at a major source of HAP emissions. Because the Kidder Compressor Station would be an area source of HAP, the Solar turbines would be exempt from Subpart YYYY.

Subpart ZZZZ of 40 CFR Part 63, NESHAP for Stationary Reciprocating Internal Combustion Engines, applies to reciprocating internal combustion engines of all sizes located at major and area sources of HAPs. The Caterpillar G3516 LE engine at the Kidder Compressor

Station would therefore be subject to Subpart ZZZZ. However, new emergency engines that satisfy the NSPS requirements of 40 CFR Part 60 Subpart JJJJ are not subject to any further requirements under NESHAP Subpart ZZZZ.

Greenhouse Gas Reporting Rule

On November 8, 2010, the EPA signed a rule that finalizes reporting requirements for the petroleum and natural gas industry under 40 CFR 98. Subpart W under 40 CFR Part 98, the Mandatory Greenhouse Gas Reporting Rule, requires petroleum and natural gas systems with actual GHG emissions of at least 25,000 metric tons of CO2e per year to report annual emissions of GHG to the EPA. Potential emissions of GHGs associated with operation of the Project, including methane emissions from fugitive leaks and equipment venting, are estimated to exceed the 25,000 metric ton threshold for the Kidder Compressor Station. In addition, GHG operating emissions from the New Jersey portion of the Project are also estimated to exceed 25,000 metric tons per year. If actual GHG emissions from the Project were equal to or greater than the reporting threshold, PennEast states that it would comply with all applicable requirements of 40 CFR Part 98. The reporting rule does not apply to construction emissions. However, we have included the construction emissions for accounting and disclosure purposes.

Chemical Accident Prevention Provisions

The chemical accident prevention provisions, codified in 40 CFR 68, are federal regulations designed to prevent the release of hazardous materials in the event of an accident and minimize potential impacts if a release does occur. The regulations contain a list of substances (including compounds found in natural gas, such as methane, propane, and ethylene) and threshold quantities for determining applicability to stationary sources. If a stationary source stores, handles, or processes one or more substances on this list in a quantity equal to or greater than specified in the regulation, the facility must prepare and submit a risk management plan. If a facility does not have a listed substance on-site, or the quantity of a listed substance is below the applicability threshold, the facility does not have to prepare a risk management plan. While the Project facilities would handle significant quantities of methane, propane, and other compounds found in natural gas, the definition of "stationary source" at 40 CFR 68 does not apply to transportation of such substances, or temporary storage incidental to transportation. Therefore, the Project would not be required to prepare a risk management plan under 40 CFR 68.

However, if there is any regulated substance or other extremely hazardous substance onsite, the facility still must comply with the requirements of the General Duty Clause in Section 112©(1) of the 1990 CAAA. The General Duty Clause is as follows:

> *"The owners and operators of stationary sources producing, processing, handling and storing such substances have a general duty to identify hazards which may result from such releases using appropriate hazard assessment techniques, to design and maintain a safe facility, taking such steps as are necessary to prevent releases, and to minimize the consequences of accidental releases which do occur."*

General Conformity

A General Conformity applicability analysis is required for any part of the Project occurring in nonattainment or maintenance areas for criteria pollutants. Section 176(c) of the CAA requires federal agencies to ensure that federally approved or funded projects conform to the applicable approved SIP. Such activities must not:

- cause or contribute to any new violation of any standard in any area;
- increase the frequency or severity of any existing violation of any standard in any area; or
- delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

General Conformity does not apply to federal actions in attainment areas or unclassifiable/attainment areas, including counties designated attainment or unclassifiable/attainment that are within the Northeast OTR. The EPA amended the General Conformity Rule in 2010 (Federal Register, Volume 75, Number 64) to exclude emissions regulated by any permit issued under minor and major NSR from a General Conformity applicability analysis.

General conformity assessments must be completed when the total direct and indirect emissions of a project would equal or exceed specified pollutant thresholds on a calendar year basis for each nonattainment or maintenance area. With regard to the Project, the relevant general conformity pollutant thresholds are shown in table 4.10.1-4. These thresholds are based on the current air quality designations (e.g., serious nonattainment, moderate nonattainment, maintenance, etc.).

Estimated emissions for the Project subject to review under the general conformity thresholds, along with a comparison to the applicable general conformity threshold are presented in table 4.10.1-4. Only construction emissions would be subject to review under general conformity, as operating emissions from the Project would be governed by the minor NSR permitting programs in Pennsylvania and New Jersey.

As shown in table 4.10.1-4, all construction emissions were conservatively assumed to occur in a single calendar year. This assumption ensures that any possible exceedance of a general conformity threshold is identified, since emissions spread over multiple calendar years would be less likely to trigger general conformity. Based on this assumption, emission estimates for construction would not exceed general conformity applicability thresholds. Based upon this evaluation, a general conformity determination would not be required. However, while general conformity applicability thresholds are not exceeded in any calendar year, if significant Project-related construction schedule modifications occur within any of the designated non-attainment areas that materially impact the amount of applicable emissions generated in a calendar year, the potential exists to exceed general conformity applicability thresholds for applicable emissions from construction. Therefore, **we recommend that:**

- **If changes to the Project construction schedule occur that would materially impact the amount of NO_X emissions generated in a calendar year, PennEast should file with the Secretary, <u>in PennEast's weekly status report</u>, revised construction emissions estimates prior to implementing the schedule modification demonstrating that the annual NO_X emissions resulting from the revised construction schedule do not exceed general conformity applicability thresholds.**

TABLE 4.10.1-4 General Conformity Applicability Evaluation					
Project Component	**Location (County, State)**	**County Nonattainment or Maintenance Pollutants a/ b/**	**Construction Emissions c/**	**General Conformity "de minimis" rates for Nonattainment or Maintenance Areas**	**General Conformity Determination Required? (Yes/No)**
23.1 miles of pipeline	Luzerne, PA	None	N/A	N/A	No
28.2 miles of pipeline, Compressor Station	Carbon, PA	O_3	34.2 tons NOx 3.7 tons VOC	100 tpy NOx 50 tpy VOC	No
24.8 miles of pipeline, 2.1 miles of lateral	Northampton, PA	$PM_{2.5}$ O_3	82.5 tons $PM_{2.5}$ 0.1 tpy SO2 22.1 tons NOx 2.8 tons VOC	100 tpy $PM_{2.5}$ 100 tpy SO2 100 tpy NOx 50 tpy VOC	No
1.7 miles of pipeline	Bucks, PA	$PM_{2.5}$ O_3	4.5 tons $PM_{2.5}$ 0.0 tpy SO2 1.4 tons NOx 0.2 tons VOC	100 tpy $PM_{2.5}$ 100 tpy SO2 100 tpy NOx 50 tpy VOC	No
26.6 miles of pipeline, 1.9 miles of lateral	Hunterdon, NJ	O_3	20.4 tons NOx 2.6 tons VOC	100 tpy NOx 50 tpy VOC	No
9.6 miles of pipeline	Mercer, NJ	O_3	6.8 tons NOx 0.85 tons VOC	100 tpy NOx 50 tpy VOC	No

Notes:
a/ Marginal or Moderate Nonattainment for the 2008 8-hour Ozone standard
b/ Maintenance Area for the 1997 and/or 2006 $PM_{2.5}$ Standards
c/ Emissions of all major construction activities would occur during one calendar year

Applicable State Air Quality Requirements

In addition to the federal regulations identified above, Pennsylvania and New Jersey have their own air quality regulations that may be applicable to the Project, which are summarized below.

Pennsylvania

Air quality regulations for the state of Pennsylvania are codified in Title 25 of the Pennsylvania Code (Pa. Code), and are administered by the PADEP.

- 25 Pa. Code Chapter 123. *Standards for Contaminants*. This chapter establishes standards and limits for emissions of various pollutants, including fugitive emissions (123.1 and 123.2), particulate matter (123.11 through 123.14), sulfur compounds (123.21 through 123.25), odor (123.31), visible emissions (123.41 through 123.46), and NO_x (123.51). These requirements would be generally applicable to the Kidder Compressor Station emission sources and to the fuel heaters at the Pennsylvania interconnect stations.

- 25 Pa. Code Chapter 124. *National Emission Standards for Hazardous Air Pollutants*. This chapter incorporates by reference the federal NESHAP standards as promulgated by EPA in 40 CFR 61 under section 112(d) of the CAA.

- 25 Pa. Code Chapter 122. *National Standards of Performance for New Stationary Sources*. This chapter incorporates by reference the federal NSPS standards as promulgated by EPA in 40 CFR 60 under section 111 of the CAA.

- 25 Pa. Code Chapter 127. *Construction, Modification, Reactivation and Operation of Sources*. This chapter implements the state air permitting program both for major sources (subject to NSR, PSD, and/or Title V) and non-major sources. The Kidder Compressor Station would be a non-major source, with potential emissions below the NSR, PSD, and Title V thresholds. The compressor turbines, emergency generator, and fuel gas heater at the Kidder Compressor Station would be required to apply to PADEP for a preconstruction permit, as well as a state-only operating permit, and the compressor turbines would be required to demonstrate the use of Best Available Technology (BAT) for control of emissions. The natural gas line heaters at the UGI-LEH and TCO interconnect stations, as well as one heater at the Blue Mountain interconnect station, would also be non-major sources, and would be required to obtain a General Plan Approval and/or General Operating Permit, which is a pre-approved air permit for a specific class of sources. General Permit GP-1 applies to small gas- and oil-fired combustion units.

<u>New Jersey</u>

Air quality regulations for the state of New Jersey are codified in Chapter 27 of the New Jersey Administrative Code (NJAC) and are administered by the NJDEP.

- NJAC 7:27-2 through 7:27-7 and 7:27-9. These subchapters establish general prohibitions against air pollution, including prohibitions on open burning, smoke and particulate from fuel combustion, odor, and sulfur emissions. These would be generally applicable to operations at the New Jersey interconnect stations.

- NJAC 7:27-8, *Permits and Certificates for Minor Facilities (and Major Facilities without an Operating Permit)*. This chapter implements the state air permitting program for non-major sources. The natural gas line heaters at the three New Jersey interconnect stations in Hunterdon and Mercer counties would be non-major sources below all NSR, PSD, and Title V thresholds. However, the heaters would exceed the size threshold for "commercial fuel burning equipment" under 7:27-8.2(c) and would be required to obtain preconstruction permits from NJDEP. PennEast would have the option to obtain General Permits for the heaters, which are pre-approved air permits for specific classes of emission sources. Depending on their individual heat input ratings, General Permits GP-009A or GP-018 would be applicable to the natural gas line heaters at the New Jersey interconnect stations.

- NJAC 7:27-19, Control and Prohibition of Air Pollution from Oxides of Nitrogen. This chapter establishes requirements for emissions from various combustion sources and other industrial facilities. If the natural gas line heaters in New Jersey were permitted using General Permits, they would be subject to the requirements under NJAC 7:27-19.16 to perform tune-ups and other adjustments to minimize emissions of NOx and CO.

4.10.1.4 Air Emissions Impacts and Mitigation

Construction Emissions and Mitigation

Construction of the Project components would result in short-term increases in emissions of some air pollutants due to the use of equipment powered by diesel fuel or gasoline engines and the generation of fugitive dust due to the disturbance of soil and other dust-generating activities. More specifically, the construction activities that would generate air emissions include:

- site preparation (land clearing, grading, excavation, etc.);
- installation of compressor station equipment;
- installation of pipeline and pipeline interconnection equipment;
- operation of off-road vehicles and trucks during construction; and
- workers' vehicles used for commuting to and from the construction site (i.e., on-road vehicles).

The total period of construction for the Kidder Compressor Station is estimated by PennEast to be 6 months, over a disturbance area of 26.2 acres. The construction emission associated with the Project activities would have short-term, localized impacts on air quality. These emissions are not subject to the air quality permitting requirements that apply to emissions from operation of stationary sources at the Kidder Compressor Station and interconnect stations. Nevertheless, the construction-related emission rates are discussed in this section as a means of identifying potential air quality concerns associated with the construction phase of the Project and to assist in developing mitigation. The amount of fugitive dust for an area under construction would depend on numerous factors including degree of vehicular traffic, size of area disturbed, amount of exposed soil, soil properties (silt and moisture content), and wind speed. Construction of the Project would also result in fuel combustion emissions from a variety of sources, including off-road sources (e.g., bulldozers, cranes, front-end loaders, pile drivers) and on-road sources (e.g., construction worker vehicles).

Site preparation activities for the Kidder Compressor Station would include land clearing, grading, creation of a retention basin, placement of gravel surfaces (e.g., lay-down areas), and construction of access roads within the station site boundaries. Site preparation activities would generate fugitive dust from earthmoving and movement of construction equipment over unpaved surfaces and tailpipe emissions from construction equipment and vehicle engines. The construction equipment and vehicles would be powered by internal combustion engines that would generate PM_{10}, $PM_{2.5}$, SO_2, NO_x, VOC, and CO emissions. Site preparation equipment would include excavators, bulldozers, forklifts, backhoes, and other mobile construction equipment. Open burning would not be used.

Air emissions would also be generated during construction of the pipeline and interconnect stations. PennEast estimates a total disturbance area of 2,431 acres during construction of the pipeline, which includes the construction right-of-way and temporary extra work space as well as pipeyards and access roads. Construction of the pipeline would occur in four separate spreads, each of which is estimated to result in 6.5 months of emission-generating activities. Preparation of access roads and pipeyards would generate emissions for an estimated 3 months, including laying and removal of gravel. Construction staging areas would produce emissions for an estimated 10 months. Pipeline site preparation and construction activities would generate fugitive dust from clearing, trenching, backfilling, grading, and traffic on paved and unpaved areas, as well as fuel combustion emissions from the construction equipment. The internal combustion engines powering most of the pipeline construction equipment and vehicles would burn ultra-low-sulfur diesel fuel and the remaining vehicles would burn gasoline. Equipment that would be used for the pipeline and interconnect station construction activities would include various earthmoving equipment (bulldozers, backhoes, trenchers, graders, and compactors), cranes, forklifts, compressors, pumps, trenchers, stringing trucks, welding rigs, rock drills, generators, and miscellaneous trucks.

Construction of the Kidder Compressor Station would include installation of three compressor turbines, one emergency generator, one fuel gas heater, and piping and instrumentation, as well as construction of foundations, storage tanks, and buildings for the warehouse, office, and control room. The construction equipment would include cranes, forklifts, welders, pipelayers, and generators, which would result in fuel combustion and fugitive dust emissions.

Construction truck traffic (e.g., supply trucks) and worker commuter vehicles would generate fugitive dust from travel on paved and unpaved surfaces as well as tailpipe emissions. PennEast has estimated that construction of the Kidder Compressor Station would involve 16 gasoline pickup trucks and three one-ton diesel tool trucks, each traveling 50 miles per day over a period of 8 months. Each of the four pipeline spreads would involve roughly 100 gasoline pickup trucks, 21 lowboy tractor trucks, 8 diesel parts vans, and 11 diesel buses, each traveling 50 miles per day over a period of 10 months.

Fuel combustion emissions from off-road construction equipment and on-road vehicles were estimated using EPA's MOVES2014 model.[22] For each equipment type, MOVES2014 can generate specific emission factors, which take into account such information as regional meteorology, regional equipment mix, and the calendar year of activity. For off-road and on-road combustion emissions, PennEast has used the predicted MOVES2014 emission factors for Luzerne County, Pennsylvania in the year 2016, and applied them to the entire Project. Year 2016 emission factors are considered conservative for emissions that occur in later years.

Fugitive dust emissions generated by on-site construction equipment were estimated using emission factors from the EPA reference document "Estimating Particulate Matter Emissions from Construction Operations" (Eastern Research Group, Inc. 1999). PennEast used the document's recommended values for roadway construction, which is considered similar in nature to pipeline construction, along with a Project-specific dry silt factor based on soil data collected for the Project.

Roadway fugitive dust emissions were estimated using emission factors from EPA's AP-42 document, with most of the vehicle miles occurring on paved rather than unpaved roadways. Fugitive dust emission estimates for unpaved roadways assume the use of water spray dust suppression with a control efficiency of 50 percent.

Total Project construction emissions for criteria air pollutants and GHG (as CO_2e) are summarized in table 4.10.1-5. These totals include fuel combustion emissions as well as fugitive

[22] EPA's most current model for estimating nonroad equipment emissions, NONROAD2008, has been incorporated into MOVES2014, which previously only modeled on-road equipment.

dust emissions. As shown, fugitive dust accounts for the majority of PM_{10} and $PM_{2.5}$ emissions during construction of the Project. PennEast has developed a Fugitive Dust Control Plan (FDCP) to mitigate these emissions. We reviewed the FDCP and find it acceptable. Measures outlined in the FDCP include the following:

- where possible, use of water for control of dust in the construction operations, the grading of roads, or the clearing of land;
- application of water, or suitable dust suppression chemicals on dirt roads, materials stockpiles, and other surfaces which may create significant airborne dust;
- where possible, paving/grading of roadways and maintaining them in a clean condition;
- removal of spilled or tracked dirt or other materials from paved streets, and of dried sediments resulting from soil erosion; and/or
- reducing vehicular traffic speed to a point below significant dust emission creation.

In addition, the Field Project Manager (FPM) and EI would determine when it is necessary to apply dust control measures during construction activities and these Project personnel would share the authority with the contractor and construction superintendent to determine if/when water needs to be reapplied for dust control and to determine if/when additional mitigation would be needed. In addition, the FPM and EI would have the authority to stop work on any activity that would not apply with the dust control measures outlined in the plan.

TABLE 4.10.1-5

Project Facility and Pipeline Construction Activity Combined Emissions

Project Total Emissions	Pollutants (Tons)							
	NO_X	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2	CO_2e	HAPs
Pipeline Diesel Non-Road Equipment Totals	**100**	**28**	**10**	**6.7**	**6.5**	**0.29**	**31,476**	**0.75**
Diesel and Gas On-Road	5	22.8	2.53	0.29	0.17	0.03	1,690	0.18
Construction Activity Fugitive Dust	-	-	-	3,859	577	-	-	-
Roadway Fugitive Dust	-	-	-	132	21	-	-	-
Comp. Station Construction Sub-Total	**6**	**5**	**1**	**28**	**4**	**0.02**	**1,712**	**0.05**
Total	**111**	**55**	**14**	**4,026**	**609**	**0.33**	**34,878**	**0.97**

PennEast has contacted 17 local municipalities, agencies, or private landowners along the length of the proposed pipeline route in Pennsylvania and New Jersey who are willing to sell water to PennEast for dust control use during construction. The quantities of water available for Project use are being confirmed.

Emissions during construction would increase pollutant concentrations in the vicinity of the Kidder Compressor Station and each of the pipeline spreads; however, their effect on ambient air quality would vary with time due to the construction schedule, the mobility of the sources, and the variety of emission sources. Construction emissions associated with the pipeline are considered temporary and would cease at completion of construction. Constructions emissions associated with the Kidder Compressor Station and interconnect stations are considered temporary. Following construction, air quality would not revert back to previous conditions, but would transition to permanent operational-phase emissions after commissioning and initial start-up.

Operating Emissions and Mitigation

Operation of the Project would result in air emissions from gas compressor turbines and other combustion equipment at the Kidder Compressor Station, fuel gas heaters at the interconnect stations, fugitive leaks, and venting emissions from various pipeline components. Operational-phase emissions would occur for the lifetime of the Project. These various sources and associated criteria pollutant, GHG, and HAP emission rates are discussed below.

Sources of air emissions associated with operation of the Kidder Compressor Station would include:

- three natural gas turbine-driven Solar Mars 100 units rated at 15,900 hp each under ISO conditions (47,700 total ISO hp);
- one new natural gas-fired Caterpillar G3516 LE auxiliary power unit, rated at 1,462 hp;
- one 1,950 gallon storage tank (for pipeline liquids collected in the gas filter);
- various small storage vessels (for waste liquids, lubricating oil, etc.); and
- one fuel gas heater rated at approximately 3.22 MMBtu/hr heat input.

Estimated operating emissions for the Kidder Compressor Station are summarized in table 4.10.1-6 for criteria pollutants, GHGs as CO_2e, total HAPs, and formaldehyde. Estimated emissions for the compressor turbines and the fuel gas heater are based on continuous operation for 8,760 hours per year. Emissions were also evaluated for 48 startup and shutdown events per year for the compressor turbines. However, these emissions are offset by the non-operational time between each shutdown and the next startup. Emissions for the emergency auxiliary power unit are based on 500 operating hours per year. Finally, emissions are also presented for fugitive leaks and planned venting activity including blowdowns. Fugitive and blowdown emissions assume a total natural gas release volume of 91,756 standard cubic feet (scf) per year, including one station-wide emergency shutdown, as well as planned blowdowns of the fuel gas system and emissions from the lube oil tank vent.

TABLE 4.10.1-6

Compressor Station Operational Phase Emissions

Air Sources	Pollutants (Tons Per Year)								
	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$	VOC a/	GHG b/	CH_2O c/	Total HAPs d/
Compressors (Turbines)	87.41	15.40	5.46	24.08	24.08	5.138	189,603	1.93	2.07
Auxiliary power unit	1.61	1.69	0.00	0.03	0.03	0.282	333	0.15	0.21
Natural Gas Heaters	0.76	0.78	0.05	0.10	0.10	0.076	1,652	0.00	0.03
Equipment Leaks						0.004	150		
Equipment Vents						0.006	47		
Total	**89.78**	**17.87**	**5.52**	**24.21**	**24.21**	**5.51**	**191,785**	**2.09**	**2.30**
Nonattainment NSR Threshold	100					50			
Subject to NSR?	No					No			

Notes:
a/ VOC = non-methane/ethane volatile organic compounds
b/ GHG = greenhouse gases, as carbon dioxide equivalents (CO2e); provided for informational purposes only
c/ CH2O = formaldehyde, the primary HAP emitted from combustion turbines
d/ HAPs = hazardous air pollutants, as aggregated total HAPs

PennEast evaluated the feasibility of installing electric motor driven compressor units at the Kidder Compressor Station, instead of the proposed natural gas-fired compressor turbines. Electric compressor motors would require approximately 35 to 40 MW of electrical power, and would be technically feasible after upgrading the local substation and transmission lines to the compressor station. However, PennEast determined that selecting electric motors as an alternative to natural gas-driven compressors would result in higher overall emissions, due to emissions created by generation of the needed electricity. PennEast compared emission rates from the proposed gas-fired compressor turbines against the equivalent emission rates published by the National Renewable Energy Laboratory (NREL) for eastern U.S. power generation in 2004. These 2004 rates were adjusted to account for changes in the generation mix and use of emission controls in the PJM regional grid as of 2010, which resulted in lower emission rates for electric generation. Even after accounting for these improvements in electric utility emissions, use of electric motor driven compressors would still increase emissions, as shown in table 4.10.1-7.

TABLE 4.10.1-7

Net Emissions Increase for Electric Motor Compressor Alternative

Pollutants (Tons Per Year)						
NO_x	CO	SO_2	PM_{10} a/	Lead	Mercury a/	GHG
221	59	842	(12)	0.010	(0.0010)	26,193

Note:
a/ Net emission reduction

PennEast also considered the possibility of using waste heat electric generation in conjunction with the proposed gas-fired compressor turbines at the Kidder Compressor Station. Based on a 2008 study by the Interstate Natural Gas Association of America (INGAA), such a design would allow the production of up to 9.6 MW of useful power that could be returned to the electric grid, when all three compressor turbines were operating at full load under optimal ambient conditions. However, the INGAA study also indicated that for a waste heat electric generation system to be technically and economically viable, the gas turbines should operate near 100 percent load for at least 5,250 hours per year, and that the project site would need sufficient space available for placement of the waste heat recovery and electric generation equipment. The expected load profile for the compressor turbines would be highly variable in response to actual utilization by PennEast's customers, and would include significant periods of operation at partial load. In addition, the site layout for the Kidder Compressor Station would be tightly constrained by surrounding wetlands, and would not allow sufficient space for placement of the waste heat recovery system, steam turbine generators, and cooling equipment. For these reasons, the use of waste heat electric generation is not considered viable for the proposed Kidder Compressor Station.

Estimated operating emissions for the Pennsylvania and New Jersey interconnect stations are summarized in table 4.10.1-8. Emissions for each line heater are based on continuous operation for 8,760 hours per year. Estimated totals are also presented for fugitive and venting emissions from valves, flanges, and actuators at the interconnect stations. These fugitive and venting emission totals also include estimated fugitive emissions from the pipeline itself, as well as pipe inspection activities for the two proposed pig launcher and receiver stations, assuming four events per year at each station.

PennEast has estimated fugitive emissions for valves, flanges, and actuators based on EPA's reference document, "Protocol for Equipment Leak Emission Estimates" (EPA 1995b). Pipeline fugitive leaks were estimated using a customary emission factor of 1.55 standard cubic foot of natural gas per day per mile of pipeline (scfd/mile), from EPA's reference document, "Oil and Natural Gas Sector Leaks" (EPA 2014). Several public comments on the Project suggested that a factor of 7.66 scfd/mile should instead be used, based on a report from the PHMSA that studies 92 actual pipeline leak events between 2010 and 2012 (DOT 2012). In response, PennEast has noted that even with this higher factor, pipeline fugitive leaks would increase the Project's potential annual GHG emissions by only 0.05 percent. The choice of emission factor for pipeline fugitive leaks does not significantly change the evaluation of environmental impacts.

TABLE 4.10.1-8

Pipeline Operational Phase Emissions

Air Sources	Pollutants (Tons Per Year)								
	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$	VOC a/	GHG b/	CH_2O c/	Total HAPs d/
UGI-LEH Interconnect Natural Gas Line Heater	2.30	1.93	0.017	0.17	0.17	0.13	2,749	0.0017	0.043
TCO Interconnect Natural Gas Line Heater	2.30	1.93	0.017	0.17	0.17	0.13	2,749	0.0017	0.043
Blue Mountain Interconnect Line Heater	0.09	0.07	0.001	0.01	0.01	0.005	103	0.0001	0.002
PA Pipeline Fugitive Leaks						0.72	5,722		
PA Interconnect Fugitives/Vents						0.003	24		
PA Pipeline Total	**4.77**	**4.01**	**0.035**	**0.36**	**0.36**	**0.99**	**11,450**	**0.00**	**0.09**
PA NSR Threshold	100					50			
Subject to NSR?	No					No			
ETG Interconnect Line Heater	2.30	1.93	0.017	0.17	0.17	0.13	2,749	0.0017	0.043
NRG Interconnect Line Heater	2.30	1.93	0.017	0.17	0.17	0.13	2,749	0.0017	0.043
Algonquin Interconnect Line Heater	13.73	11.53	0.100	1.04	1.04	0.76	16,412	0.0103	0.259
Tetco Interconnect Line Heater	10.98	9.23	0.080	0.83	0.83	0.60	13,130	0.0082	0.207
Transco Interconnect Line Heater	16.82	14.13	0.123	1.28	1.28	0.92	20,105	0.0126	0.318
NJ Pipeline Fugitive Leaks						1.93	15,666		
NJ Interconnect Fugitives/Vents						0.001	11		
NJ Pipeline Total	**46.13**	**38.75**	**0.34**	**3.51**	**3.51**	**4.47**	**70,823**	**0.03**	**0.87**
NJ NSR Threshold	25					25			
Subject to NSR? e/	No					No			

Notes:
a/ VOC = non-methane/ethane volatile organic compounds
b/ GHG = greenhouse gases, as carbon dioxide equivalents (CO_2e); provided for informational purposes only
c/ CH_2O = formaldehyde, the primary HAP emitted from combustion turbines
d/ HAPs = hazardous air pollutants, as aggregated total HAPs
e/ The nonattainment NSR thresholds are applied separately for each heater site in NJ, each of which is individually below the NSR thresholds.

Table 4.10.1-9 summarizes estimated operating emissions for all components of the Project in Pennsylvania and New Jersey. All Project components are located in marginal ozone nonattainment areas, with the exception of Pipeline Spread 1 in Luzerne County, PA, which is classified as attainment for all pollutants. See table 4.10.1-3 for detailed attainment status designations at the specific Project component locations. As shown, operating emissions for each separate component of the Project are below all major source thresholds for criteria pollutants and HAPs.

TABLE 4.10.1-9

Project Operational Total PTE

.Air Sources	Pollutants (Tons Per Year)								
	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$	VOC a/	GHG b/	CH_2O c/	Total HAPs d/
Compressor Station	89.78	17.87	5.52	24.21	24.21	5.51	191,785	2.09	2.30
PA Pipeline Total	4.77	4.01	0.03	0.36	0.36	0.99	11,450	0.00	0.09
NJ Pipeline Total	46.13	38.75	0.34	3.51	3.51	4.47	70,823	0.03	0.87
Project Total Operational	**140.68**	**60.62**	**5.89**	**28.08**	**28.08**	**10.96**	**274,057**	**2.12**	**3.26**

Notes:
a/ VOC = non-methane/ethane volatile organic compounds
b/ GHG = greenhouse gases, as carbon dioxide equivalents (CO_2e); provided for informational purposes only
c/ CH_2O = formaldehyde, the primary HAP emitted from combustion turbines
d/ HAPs = hazardous air pollutants, as aggregated total HAPs

Project operational emission impacts would be mitigated by the following measures:

- selection of compressor turbines and other fuel combustion equipment that meet all applicable federal and local emission limits, including BAT for the Kidder Compressor Station turbines;
- use of natural gas as the exclusive fuel for the Kidder Compressor Station and interconnect station combustion sources;
- implementation of a leak detection and monitoring program to minimize fugitive leaks at all above-ground Project facilities; and
- compliance with environmental, safety, and transportation regulations of the DOT, DOE, and EPA.

In addition, PennEast would take the following specific measures to reduce the risk of methane and VOC leaks:

- In advance of the Project being placed into service, all pressure containment systems would be leak-tested;
- To the extent practicable, threaded and flanged connections would be eliminated through strategies such as using weld end valves;
- A smart pig inspection tool would be used to detect any corrosion or pitting on the inner pipeline wall that might result in leaks;
- Piping systems would be equipped with cathodic protection measures to prevent corrosion, and all piping would be routinely inspected to National Association of Corrosion Engineers' standards;

- Enclosed areas at the compressor station with high concentrations of fittings and valves would be equipped with permanent continuous gas detection devices;
- All meter and compressor station sites would be routinely and regularly inspected by PennEast personnel; and
- Periodic surveys would be conducted at meter stations and the compressor station using state-of-the-art leak detection technologies.

4.10.1.5 Operational Impact Assessment

As requested by FERC, PennEast conducted an air dispersion modeling analysis for the Kidder Compressor Station, in order to assess impacts with respect to the NAAQS and the Significant Impact Levels (SILs). A modeling summary report was included with PennEast's December 2015 response to FERC's November 24, 2015 data request.

As shown in the summary report, the potential emissions from the Kidder Compressor Station would be below all major source thresholds. The following proposed emission sources at the Kidder Compressor Station were included in the modeling analysis:

- three natural gas turbine-driven Solar Mars 100 units rated at 15,900 hp each under ISO conditions; and
- one natural gas-fired Caterpillar G3516 LE auxiliary power unit, rated at 1,462 hp.

The modeling analysis considered impacts for short-term and long-term emission scenarios. Short-term emission rates are based on the ambient temperature producing the highest 1-hour emission rate, while long term emission rates are based on a more likely temperature for long-term operation. Long-term emission rates for the combustion turbines assume continuous operation for 8,760 hours per year, while long-term rates for the auxiliary power unit assume a limit of 500 operating hours per year.

PennEast conducted its modeling analysis using the most current version of AERMOD, Version 15181, which is one of the EPA-recommended models for use in PSD and NSR permitting projects. Surface meteorological data for the five-year period 2010-2014 was taken from the Wilkes-Barre Scranton International Airport, located approximately 18 miles (29 km) north-northwest of the proposed Kidder Compressor Station. PennEast used upper air data from the Brookhaven/Upton station, located in southeastern New York State, approximately 147 miles (237 km) east-southeast of the proposed Kidder Compressor Station.

PennEast also accounted for downwash effects induced by airflow around buildings or other structures in the near vicinity of the stacks at the proposed Kidder Compressor station. Locations and dimensions of the proposed buildings, combustion turbines, engine, and exhaust stacks were entered into AERMOD's Building Profile Input Program module, which was used to simulate the effect of downwash on pollutant concentrations near the Project site.

PennEast has modeled NO_2 impacts using both the Tier 1 and Tier 2 approaches recommended by EPA in Appendix W to 40 CFR 51. The Tier 1 approach assumes that 100 percent of the emitted NO_x is converted to NO_2 upon exiting the stack. The Tier 2 approach assumes that only a fraction of the total NO_x is converted to NO_2. (For this analysis, PennEast used Tier 2 conversion rates of 80 percent for the 1-hour modeled impacts, and 75 percent for the annual modeled impacts.) In practice, both the Tier 1 and Tier 2 assumptions are conservative, as a majority of the total NO_x from typical combustion sources remains in the form of NO.

The Project impacts for NO_2 presented in table 4.10.1-10 only include emissions from the proposed combustion turbines at the Kidder Compressor Station. The auxiliary power unit was not included in the modeled NO_2 impacts because it would be used as an emergency engine with very intermittent operation. To support this approach, PennEast cites EPA's 2011 guidance regarding NO_2 modeling for intermittent sources (such as emergency engines), which notes that the probabilistic nature of the 1-hour NO_2 NAAQS makes it overly stringent when applied to sources that do not have the potential to operate in a relatively continuous fashion (EPA 2011).

Modeling Results

Table 4.10.1-10 presents modeled impacts for the proposed Kidder Compressor Station, as compared to the SILs established by EPA for each different pollutant and averaging period. Modeled impacts that are below the SILs are considered sufficiently small relative to the NAAQS that they are presumed not to contribute to any possible violation of a NAAQS standard. For major sources subject to PSD or NSR permitting, if a modeled impact is shown to exceed the SIL, then cumulative modeling that includes other nearby major pollutant sources would generally be required, in order to demonstrate that cumulative impacts would not violate the NAAQS. In this case, since the Project in not subject to PSD or NSR permitting requirements, no cumulative modeling that includes other nearby major pollutants sources would be required.

TABLE 4.10.1-10

Comparison of Kidder Compressor Station Impacts on SILs

Pollutant	Averaging Period	Statistical Basis	Project Impact (μg/m^3)	SIL (μg/m^3)
NO_2 a/	1-hour (Tier 1)	H1H c/	25.58	7.5
	1-hour (Tier 2)	H1H c/	20.47	7.5
	Annual (Tier 1)	Max. of 5 yrs. d/	0.36	1
	Annual (Tier 2)	Max. of 5 yrs. d/	0.27	1
CO	1-hour	Max.	106.07	2,000
	8-hour	Max.	74.85	500
PM_{10}	24-hour	Max.	1.72	5
$PM_{2.5}$ b/	24-hour	H1H e/	1.07	1.2
	Annual	Max. of 5 yrs. d/	0.10	0.3
SO_2	1-hour	H1H f/	27.58	7.8
	3-hour	Max.	18.39	25
	24-hour	Max.	7.17	5
	Annual	Max. of 5 yrs. d/	0.02	1

Notes:
a/ NO_2 impacts are based upon EPA's Tier 1 procedure (100% conversion of NO_x to NO_2) and Tier 2 procedure (80% conversion of NO_x to NO_2 for 1-hour impacts and 75% conversion for annual impacts).
b/ $PM_{2.5}$ SILs became effective December 20, 2010 (refer to October 20, 2010 Federal Register) and were removed through a final rule in December 9, 2013 Federal Register (in response to court vacatur). They are only provided for informational purposes.
c/ The 5-year average of the highest daily maximum 1-hour average NO2 concentrations (high-1st-high).
d/ The highest annual value from the the 5 years modeled (2010-2014).
e/ The 5-year average of the highest 24-hour PM2.5 concentrations (high-1st-high).
f/ The 5-year average of the highest daily maximum 1-hour average SO2 concentrations (high-1st-high).

As shown, the Project impacts are predicted to exceed the SILs for 1-hour NO_2, 1-hour SO_2, and 24-hour SO_2. If the proposed Kidder Compressor Station were a major source subject to PSD or NSR permitting, then PennEast would likely be required by PADEP to also identify any existing major sources nearby and include their emissions in the modeled impacts. However, since the proposed compressor station would be a non-major source, the inclusion of such sources is not required.

Table 4.10.1-11 presents an approximation of potential cumulative impacts by adding modeled Project impacts on the existing background concentrations, as measured by regional continuous pollutant monitors. These cumulative totals are then compared to their respective NAAQS standards. The Project impacts shown in table 4.10.1-11 differ slightly from those in table 4.10.1-10 because they are presented in the same form as the NAAQS standards, which are defined on a different statistical basis depending on the pollutant and averaging period.

The background concentrations used in table 4.10.1-11 represent the highest observed value at the closest available monitoring site for each pollutant, ranging from 16 to 25 miles (26 to 40 km) away from the proposed compressor station site. This approach for estimating total impacts is quite conservative, since it does not account for the considerable real-time variation in measured ambient background concentrations, but simply adds the worst-case modeled project impact to the worst-case measured background.

As shown, the estimated total impacts would be below the NAAQS for all pollutants and averaging periods.

TABLE 4.10.1-11

Comparison of Kidder Compressor Station Impacts on NAAQS

Pollutant	Averaging Period	Statistical Basis	Project Impact (µg/m³)	Background a/ (µg/m³)	Total Impacts Hs = 50 ft (µg/m³)	NAAQS (µg/m³)	Percent of NAAQS (%)
NO_2 b/ c/	1-hour (Tier 1)	H8H f/	19.81	75.8	95.6	188	50.9
	1-hour (Tier 2)	H8H f/	15.85	75.8	91.7	188	48.8
	Annual (Tier 1)	Max. of 5 yrs. g/	0.36	7.6	7.9	100	7.9
	Annual (Tier 2)	Max. of 5 yrs. g/	0.27	7.6	7.9	100	7.9
CO	1-hour	Max.	106.07	2,061	2,167	40,000	5.4
	8-hour	Max.	74.85	1,488	1,563	10,000	15.6
PM_{10}	24-hour	Max.	1.72	45.0	46.7	150	31.1
$PM_{2.5}$ d/	24-hour	H1H h/	1.07	19.7	20.7	35	59.2
	Annual	Max. of 5 yrs. g/	0.10	8.7	8.8	12	73.3

TABLE 4.10.1-11 Comparison of Kidder Compressor Station Impacts on NAAQS							
Pollutant	**Averaging Period**	**Statistical Basis**	**Project Impact ($\mu g/m^3$)**	**Background a/ ($\mu g/m^3$)**	**Total Impacts Hs = 50 ft ($\mu g/m^3$)**	**NAAQS ($\mu g/m^3$)**	**Percent of NAAQS (%)**
SO_2 e/	1-hour	H4H i/	24.05	20.9	45.0	196	23.0
	3-hour	Max.	18.39	20.9	39.3	1,300	3.0
	24-hour	Max.	7.17	13.1	20.3	365	5.6
	Annual	Max. of 5 yrs. g/	0.02	3.8	3.82	80	4.8

Notes:
a/ Background data for CO and NO_2 came from the Scranton, PA monitor (420692006) located approximately 40 km NNE from Kidder Compressor Station. Background data for SO_2 and PM_{10} came from the Wilkes-Barre, PA monitor (420791101) located approximately 26 km NW from Kidder Compressor Station. Background data for $PM_{2.5}$ came from the Monroe County, PA monitor (420890002) located approximately 28 km E from Kidder Compressor Station.
b/ NO_2 impacts are based upon EPA's Tier 1 procedure (100% conversion of NO_x to NO_2) and Tier 2 procedure (80% conversion of NO_x to NO_2 for 1-hour impacts and 75% conversion for annual impacts).
c/ Annual NO_2 background concentrations were not available from either EPA or Pennsylvania DEP and were conservatively estimated as 10% of the 1-hour NO_2 background.
d/ $PM_{2.5}$ SILs became effective December 20, 2010 (refer to October 20, 2010 Federal Register) and were removed through a final rule in December 9, 2013 Federal Register (in response to court vacatur). They are only provided for informational purposes.
e/ 3-hour SO_2 background concentrations were not available from either EPA or Pennsylvania DEP and were conservatively estimated as equal to the 1-hour SO_2 background. Annual SO_2 background concentrations were not provided in PennEast modeling summary, and were retrieved from U.S. EPA AirData website at https://www3.epa.gov/airdata/ad_rep_mon.html.
f/ The 5-year average of the 98th percentile of the daily maximum 1-hour average NO2 concentrations (high-8th-high).
g/ The highest annual value from the the 5 years modeled (2010-2014).
h/ The 5-year average of the highest 24-hour PM2.5 concentrations (high-1st-high).
i/ The 5-year average of the 99th percentile of the daily maximum 1-hour average SO2 concentrations (high-4th-high).

4.10.1.6 Responses to Public Comments

Loss of CO_2 Sequestration Capacity

We received comments that the removal of trees along the pipeline route would result in permanent loss of CO_2 sequestration capacity, and should be compensated for elsewhere. Carbon sequestration is the process through which plant life removes carbon dioxide from the atmosphere and stores it in biomass. The Project would impact approximately 633 acres of forested land, and 181 acres of this forested land would revert back to forest. Young, fast-growing trees in particular would remove more carbon dioxide from the atmosphere than they would release. While there would be a slight long-term effect of reduced carbon sequestration due to removal of trees from the permanent right-of-way, the temporary right-of-way would revert back to pre-existing conditions. This young vegetation of the restored temporary right-of-way would continue to perform the carbon sequestration process. The diminished carbon sequestration ability of the permanent right-of-way would be reduced; however, we do not believe the impact of the project would have significant impacts on cumulative carbon sequestration.

PennEast is implementing several mitigative measures with the intent of providing for no net loss in vegetative sequestration capacity. These measures include the following:

- at the request of state agencies and some landowners the alignment has been shifted from forested areas to agricultural lands, reducing the removal of trees from the right-of-way;

- development of a mitigation plan to restore wetlands at a greater than 1:1 ratio to ensure no net loss from the conversion of forested wetlands along the proposed right-of-way;
- along the 50-foot-wide permanent right-of-way, only the center 30 feet would be maintained free of woody vegetation, and the remaining 20 feet would be allowed to revegetate naturally; and
- purchase of forested land for permanent conservation and/or reforestation are other measures under consideration.

Radon Exposure

We received comments that the Marcellus Shale gas has high radon level content, and that natural gas leaks would release radon into the outdoor air, into homes, and into groundwater and drinking water wells. The Commission has addressed the radon concentration of natural gas in multiple certificate proceedings, including recently in CP14-96-000. The Environmental Impact Statement in that proceeding cited to a July 2012 study of natural gas samples collected from Texas Eastern and Algonquin pipelines from the Marcellus shale gas fields (Anspaugh, 2012). The study found that radon concentrations in natural gas pipelines are significantly less than the average indoor and outdoor radon levels. Based on all of the available studies, including the Anspaugh study, the Staff concluded that the risk of exposure to radon is not significant.

Radon is a potential problem in confined spaces (basements, crawl spaces, etc.) where air circulation is limited. In addition, because radon is unaffected by combustion, the use of natural gas can increase the level of radon within a home. Several factors, however, limit the exposure of the homeowner to radon from natural gas. Radon's half-life, defined as the time it takes for the compound to decay to half its initial concentration, is relatively short (3.8 days). The time needed to gather, process, store and deliver natural gas allows a portion of the entrained radon to decay, thereby decreasing the amount of radon in the gas before being used in a residence.

Regarding the potential for radon releases into groundwater and drinking water wells, the pipeline would be built relatively close to the surface compared to the depth of drinking water wells, and gas leaks would be monitored and repaired so as to prevent leakage. The possibility of the radon contamination of groundwater or drinking water wells due to pipeline leakage from the Project would be minimal.

We also received a comment that pipe trench excavation would release radon and/or dust emissions containing radioactive materials. Potential radon emissions from construction activities would be limited by the content of these materials in the rock or soil. Typically there are only traces of radioactive materials present in surface formations. Also, the impact of dust emissions would be mitigated by the effective use of emission controls in accordance with the FDCP. Radon emissions from pipe trench excavation, if any, would tend to diffuse rapidly in the outdoor air, and the short half-life of radon would prevent the buildup of concentrations in ambient air. Therefore, impacts of construction related emissions of radon to the resource are expected to be minimal.

Arsenic Exposure

Some commenters raised concerns regarding potential arsenic contained in the native soils and geology and how these may interact with pipeline methane leaks. Concerns related to arsenic contamination are addressed in the geology discussion in section 4.1.5.5 of this EIS. As discussed there, PennEast commissioned a study of potential arsenic mobilization during construction and operation of the proposed Project (Serfes, 2016). This study found no potential for mobilization of arsenic from naturally occurring arsenic-bearing rocks during the operational phase of the Project. However, in order to address public concerns, PennEast has committed to conducting groundwater quality testing of potentially affected groundwater wells adjacent to the construction work areas, both prior to and after construction. In the unlikely event that construction of the Project causes an increase in arsenic above safe drinking water levels, PennEast would provide a treatment system to remove arsenic from the drinking water at individual properties or, provide an alternative water source.

Compressor Station Venting

We received comments expressing concerns about potential impacts on nearby residences, including concerns that the compressor station venting can release HAP compounds and noxious odors that can cause severe health problems for people living nearby. In addition, comments expressed concern that one large compressor station instead of three smaller ones would have negative health impacts. Potential HAP emissions from operation of the compressor station are presented in table 4.10.1-6, and would be small. The risk for negative health impacts from compressor station venting is considered to be minimal.

Other Effects of Methane Leaks

We received comments that the methane leaks may contribute to ground-level ozone. VOCs are one of the main air contaminants that contribute to ground-level ozone pollution. This is due to the photochemical reactivity of many VOCs that break down in sunlight and thereby react with oxygen molecules to create ozone. According to scientific research, methane and ethane, which make up more than 99.99 percent of natural gas, exhibit negligible photochemical reactivity. This is confirmed by the definition of VOC at 40 CFR 51.100 paragraph (s) where methane and ethane are specifically excluded from being regulated as VOC due to exhibiting negligible photochemical reactivity. As shown previously in table 4.10.1-8, the minor amount of VOC contained in natural gas means that the estimated VOC emissions from fugitive leaks along the pipeline and at the interconnect stations would be 5.46 tons per year, which is an insignificant amount.

We received a comment that methane leaks into soil can displace oxygen and impair plant growth and cropland. A similar comment expressed concern that methane could accumulate inside nearby homes in detectable quantities as a result of fugitive leaks. The estimated rate of fugitive leakage for the Project would be 1.55 standard cubic feet of natural gas per day per mile of pipeline, which is insufficient to create any significant accumulation of methane in soils or nearby homes. Through the implementation of its leak detection and repair program, PennEast would routinely inspect its pipeline and aboveground facilities for the occurrence of any significant leaks. See additional discussion of potential for methane leaks and measures that PennEast has proposed to reduce that potential in section 4.10.1.4.

GHG Emissions from Pipeline and Production Well Leakage

We received comments that the natural gas production actually would result in greater greenhouse gas emissions than coal or oil use, when methane leakage from well sites and pipelines are considered. GHG emissions from fugitive pipeline leaks are discussed in section 4.10.1.4, and quantified in table 4.10.1-8. As shown in that section, GHG emissions due to fugitive leakage would be a small fraction of total GHG emissions from the Project. Consideration of leakage from natural gas production well sites is beyond the scope of this Project.

Slowed Transition to Renewable Energy

We received comments that cheap supplies of natural gas would slow the transition to renewable and non-fossil energy sources. The rate at which renewable energy projects are developed is influenced by numerous factors that are not reasonably foreseeable. Such unforeseeable factors include in changes in future energy prices, as well as future decisions by regulatory agencies to influence renewable energy development through tax credits or other incentives. Potential impacts from the Project on renewable energy development are therefore beyond the scope of this review.

4.10.2 Noise

Construction and operation of the Project would affect the overall noise levels in the vicinity of Project components. At any location, both the magnitude and frequency of noise generated by the Project may vary considerably due to various factors such as the Project-specific activity taking place, changing weather conditions and the effects of seasonal vegetative cover.

Two measures used by federal agencies to relate the time-varying quality of environmental noise to its known effect on people are the sound level (L_{eq}) and the L_{dn}. The L_{eq} is a sound level over a specific time period corresponding to the same sound energy as measured for an instantaneous sound level assuming it is a constant noise source. Sound levels, measured in decibels (dB), are perceived differently, depending on length of exposure and time of day. The L_{dn} takes into account the duration and time the noise is encountered. Specifically, in the calculation of the L_{dn}, nighttime (10:00 p.m. to 7:00 a.m.) noise exposures are increased by 10 dB to account for people’s greater sensitivity to sound during nighttime hours.

To account for the human ear’s sensitivity to low-level noises, decibel levels are corrected using the A-weighted scale (dBA). The A-weighted scale is used because human hearing is less sensitive to low and high frequencies than mid-range frequencies. A 3-dB change of sound level is considered to be barely perceivable by the human ear, a 5- or 6-dB change of sound level is considered noticeable, and a 10-dB increase is perceived as if the sound intensity has doubled.

4.10.2.1 Noise Regulatory Requirements

Federal Regulations

In 1974, the EPA published *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety* (EPA, 1974). This document provides information for state and local governments to use in developing their own ambient noise standards. The EPA has determined that to protect the public from activity interference and annoyance outdoors in residential areas, noise levels should not exceed an L_{dn} of 55 dBA. We have adopted this criterion and use it to evaluate the potential noise impacts of projects at NSAs, such as residences, schools, or hospitals. Because late night and early morning noise exposures are increased by 10 dB in the L_{dn} calculation to account for people’s greater sensitivity to sound during nighttime hours, a facility that meets the 55 dBA L_{dn} limit must be designed such that actual constant noise levels on a 24-hour basis do not exceed 48.6 dBA L_{eq} at any NSA.

State Regulations

There are no applicable Commonwealth of Pennsylvania regulations (relevant to noise) that would apply to the Project.

As shown in table 4.10.2-1, the NJAC provides the following noise emission limits from industrial facilities with respect to receiving residential properties.

TABLE 4.10.2-1

State of New Jersey Daytime and Nighttime Noise Thresholds

Noise Type	Unweighted Noise Level Thresholds, per Octave Band Center Frequency (Hz)									
	31.5	63	125	250	500	1000	2000	4000	8000	dBA
Continuous airborne sound, daytime (7 a.m. to 10 p.m.)	96	82	74	67	63	60	57	55	53	65
Continuous airborne sound, nighttime (10 p.m. to 7 a.m.)	86	71	61	53	48	45	42	40	38	50

While table 4.10.2-1 noise thresholds may apply to temporary HDD and pipeline construction noise, the FERC threshold of 55 dBA L_{dn} would (on the basis of its implication of no more than 48.6 dBA L_{eq} for each hour for a continuous noise source) be considered more stringent.

Local Regulations

Within the Commonwealth of Pennsylvania there are no noise requirements at the county or local levels that include numerical decibel limits. Kidder Township provides qualitative noise guidance, which is described further below. Similarly, New Jersey does not have any noise requirements that include numerical decibel limits; however, the Frenchtown municipal regulations prescribe limitations on hours of construction, described further below.

Kidder Township, Pennsylvania, the jurisdiction within which the Kidder Compressor Station site is being considered, has the following relevant qualitative noise regulation:

> *"It shall be unlawful for any person to make, continue or cause to be made or continued any loud, unnecessary or unusual noise or any noise which either annoys, disturbs, injures or endangers the comfort, repose, health, peace or safety of others, within the limits of Kidder Township, Pennsylvania."*

As no decibel limits are prescribed, this noise analysis assumes the FERC threshold of 55 dBA L_{dn} as a basis for compliance.

In Frenchtown, New Jersey, municipal regulations include set limits on construction activity hours that are expected to apply to pipeline construction.

> *"No person shall operate or permit to be operated any tool or equipment used in construction, drilling or demolition work between the hours of 8:00 p.m. and 7:00 a.m. the following day on weekdays or at any time on Sundays or legal holidays, such that the sound therefrom creates unreasonable noise across a residential real property boundary or in a noise-sensitive area."*

The municipal regulations also provide a permit application process if the above prohibition is not expected to be met.

4.10.2.2 Existing Noise Levels

PennEast conducted ambient sound surveys for the proposed Kidder Compressor Station, at the HDD entry and exit sites of the proposed HDD crossings, and at the MLV stations.

Kidder Compressor Station

Sound pressure level measurements were conducted by PennEast from April 22 through April 24, 2015 for the proposed Kidder Compressor Station site to collect ambient sound data at the nearest NSAs. Two unattended long-term (LT, 48-hour duration) and 19 attended short-term (ST, 15 to 20 minutes duration each) measurements were conducted. The ST measurements were conducted at a set of four locations with 4-5 measurement datasets performed at each one to capture data representative of different times of day (e.g., morning, afternoon, and night). A summary of the NSAs nearest to the Kidder Compressor Station, their distance from the compressor station, and the ambient sound level are presented in table 4.10.2-2.

TABLE 4.10.2-2

Kidder Compressor Station – Summary of Ambient Sound Survey Results

Nearby NSAs	Distance and Direction of NSA from Comp. Building	Ambient Sound Level (dBA, L_{dn})
Econolodge (LT1)	2,310 feet north	57
Pizza Residence (LT2)	1,920 feet north	58
Golf Course (nearest fairway)	3,170 feet northeast	57 a/

Note:
a/ Not measured during field survey, but conservatively assumed similar to that of LT1.

Ambient sound levels at NSAs are based on data collected from the two long-term meters. Elevated ambient levels at those locations are largely attributed to vehicle-related noise from traffic on the Interstate-80.

HDD Sites

Sound pressure level measurements were conducted in the vicinity of the HDD entry and exit sites of the proposed HDD crossings on October 26, 2015 using the same methodology as that used to collect baseline data for the Kidder Compressor Station. Short-term daytime and nighttime measurements were collected in the vicinity of the Project's 10 HDD sites. A summary of the sound level measurement data and associated meteorological conditions are presented in table 4.10.2-3.

TABLE 4.10.2-3 HDD Sites - Summary of Ambient Sound Survey Results				
Nearest NSA	**HDD Crossing**	**Distances (feet) to HDD Entry / Exit**	**Baseline Site ID**	**Ambient Sound Level (Ldn, dBA)**
NSA 1-Entry	US Hwy 81 / St. Hwy 315	2,900/1,500	M1	68
NSA 2-Exit	US Hwy 81 / St. Hwy 315	2,030/3,160	M3	58
NSA-3A Entry	Wild Creek & Pohopoco Creek (Beltzville Lake)	601/6,951	M4	49
NSA 3B-Entry	Wild Creek & Pohopoco Creek (Beltzville Lake)	1,000/7,026	M4	49
NSA 3C-Entry	Wild Creek & Pohopoco Creek (Beltzville Lake)	949/6,203	M4	49
NSA-4A Exit	Wild Creek & Pohopoco Creek (Beltzville Lake)	6,950/700	M5	43
NSA-4B Exit	Wild Creek & Pohopoco Creek (Beltzville Lake)	6,451/950	M5	43
NSA-4C Exit	Wild Creek & Pohopoco Creek (Beltzville Lake)	6,218/1,344	M5	43
NSA-5A Entry	St. Lukes (Lowes)	1,195/3,870	M8	66
NSA-5B Entry	St. Lukes (Lowes)	832/2,944	M7	65
NSA-6A Exit	St. Lukes (Lowes)	5,135/2,580	Est.	50
NSA-6B Exit	St. Lukes (Lowes)	2,137/2,076	M9	63
NSA-7A Entry	Lehigh River	2,605/4,675	Est.	52/
NSA-7B Entry	Lehigh River	2,244/5,344	M9	63
NSA-8 Exit	Lehigh River	4,820/1,375	M10	63
NSA-9A Entry	Interstate 78	610/2,545	M10	63
NSA-9B Entry	Interstate 78	1,397/2,614	M10	63
NSA-9C Entry	Interstate 78	1,417/1,333	Est.	55
NSA-10A Exit	Interstate 78	2,010/645	Est.	52
NSA-10B Exit	Interstate 78	3,366/883	Est.	47
NSA-10C Exit	Interstate 78	2,431/653	Est.	56
NSA-11A Exit	Delaware River and Canal	1,905/1,155	M11	62
NSA-11B Exit	Delaware River and Canal	3,689/1,879	M11	62
NSA-11C Exit	Delaware River and Canal	1,736/1,678	M12	53
NSA-12A Entry	Delaware River and Canal	215/2,575	M12	53
NSA-12B Entry	Delaware River and Canal	221/2,640	M12	53
NSA 12C-Entry	Delaware River and Canal	702/1,973	M12	53
NSA-13A Entry	Lockatong Creek	547/6,820	Est.	50
NSA-13B Entry	Lockatong Creek	1,167/5,793	Est.	39
NSA-14A Exit	Lockatong Creek	5,453/943	Est.	38
NSA-14B Exit	Lockatong Creek	7,343/1,216	Est.	36
NSA-21A Entry	Alexauken Creek	545/5,877	Est.	45
NSA-21B Entry	Alexauken Creek	1,038/5,918	Est.	48
NSA-22A Exit	Alexauken Creek	6,031/1,280	Est.	52
NSA-22B Exit	Alexauken Creek	6,713/1,197	Est.	50
NSA-15A Entry	Pleasant Valley Road	740/2,545	M17	43
NSA-15B Entry	Pleasant Valley Road	1,000/3,866	M17	43
NSA-15C Entry	Pleasant Valley Road	840/3,759	M17	43

TABLE 4.10.2-3 HDD Sites - Summary of Ambient Sound Survey Results				
Nearest NSA	**HDD Crossing**	**Distances (feet) to HDD Entry / Exit**	**Baseline Site ID**	**Ambient Sound Level (Ldn, dBA)**
NSA-16A Exit	Pleasant Valley Road	2,385/1,215	M17	43
NSA-16B Exit	Pleasant Valley Road	2,017/1,321	M17	43
NSA 17-Entry	Washington Crossing Pennington Road	1,095/2,590	M14	57
NSA 18-Exit	Washington Crossing Pennington Road	3,730/1,090	M13	60
NSA-19 Exit	CSXT Railroad	1,960/1,405	M15	57
NSA-20 Entry	CSXT Railroad	180/2,815	M16	59

Figure 4.10.2-1 shows the NSAs and ambient sound level measurement locations in the vicinity of the Kidder Compressor Station. Figures 4.10.2-2 through 4.10.2-12 show the NSAs and ambient sound level measurement locations in the vicinity of the HDD sites.

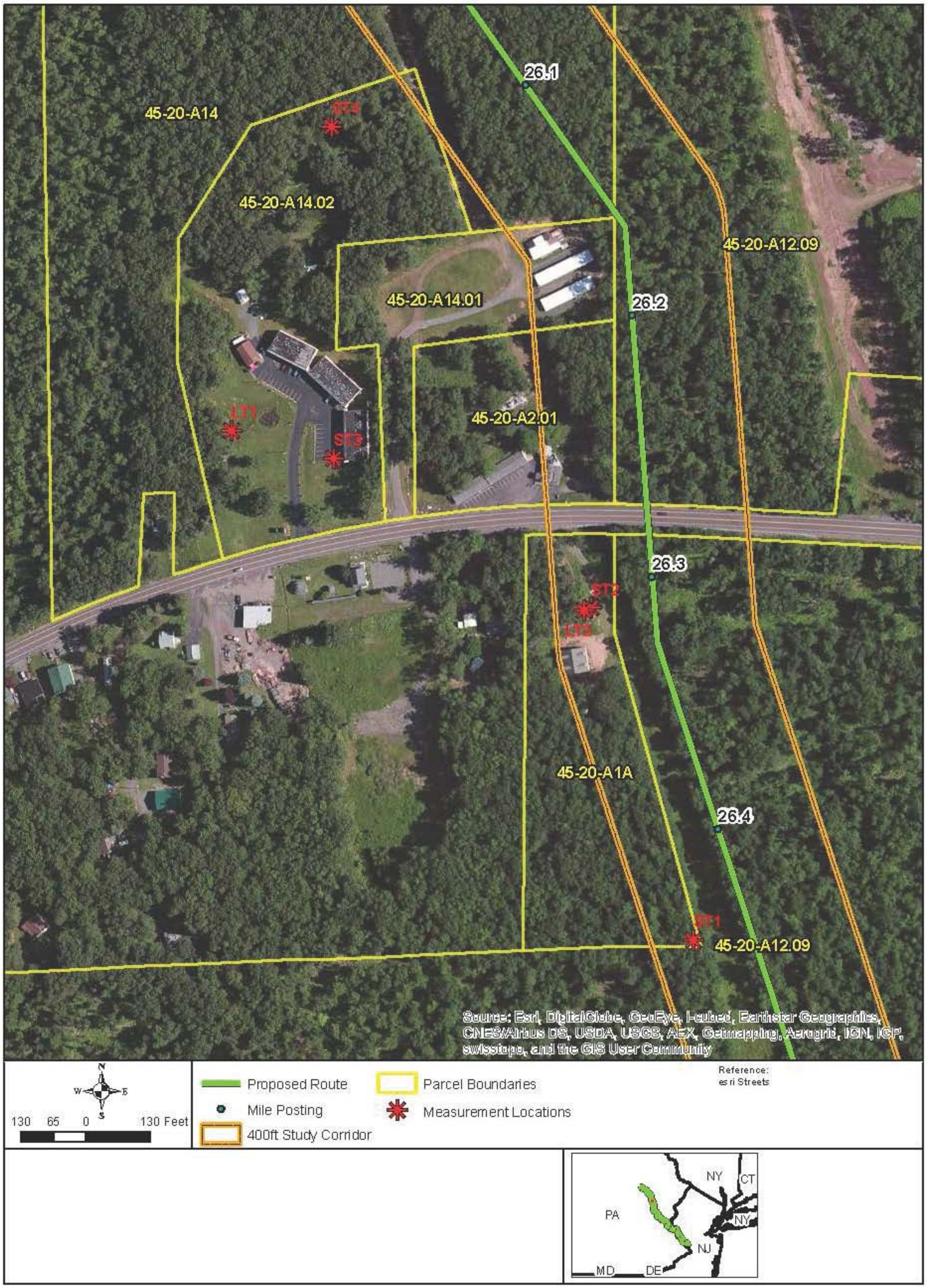

Figure 4.10.2-1 Kidder Compressor Station: NSAs and Ambient Sound Level Measurement Locations

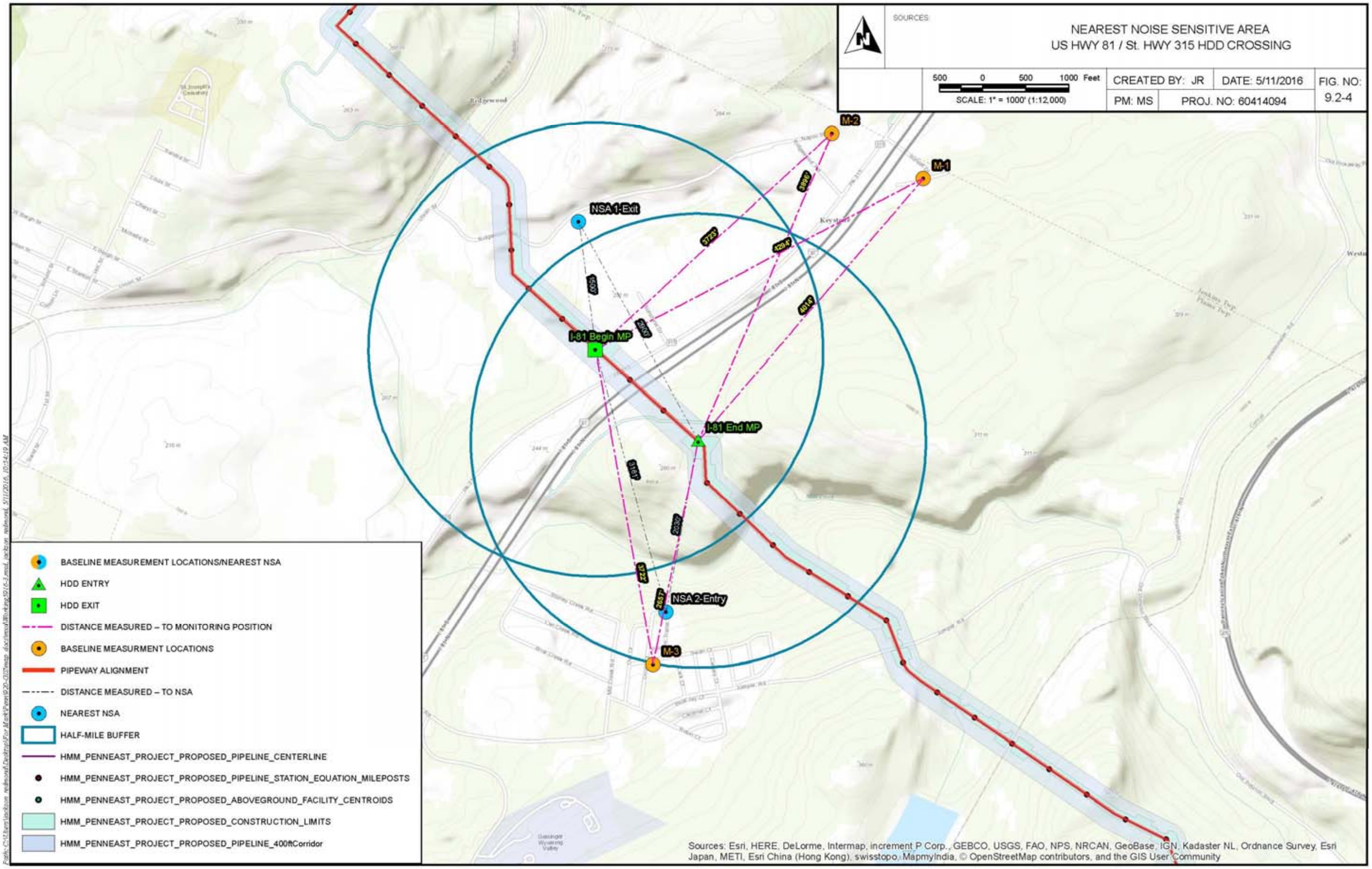

Figure 4.10.2-2 US Hwy 81 / St. Hwy 315 HDD Site: NSAs and Ambient Sound Level Measurement Locations

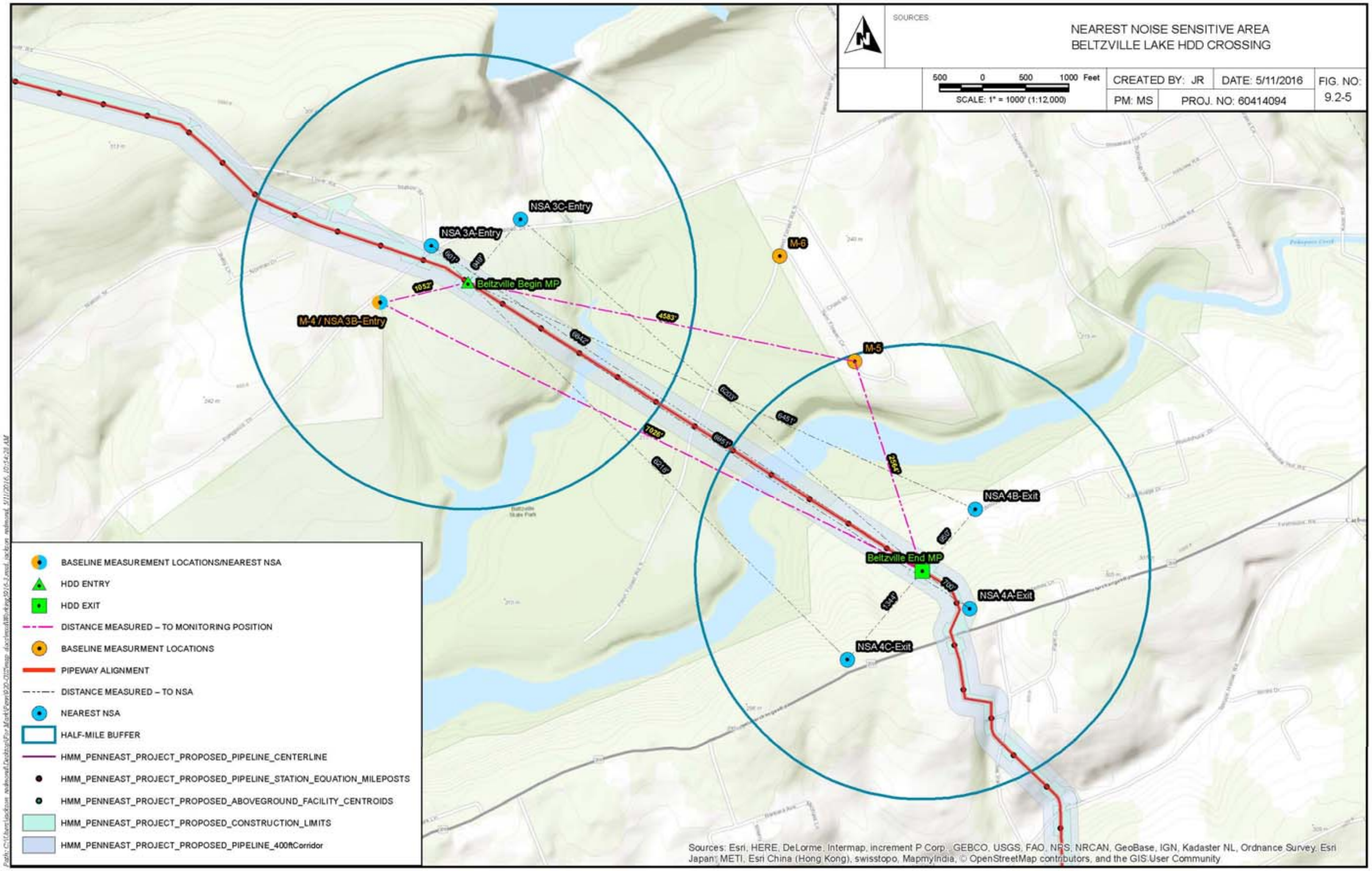

Figure 4.10.2-3 Wild Creek & Pohopoco Creek (Beltzville Lake) HDD Site: NSAs and Ambient Sound Level Measurement Locations

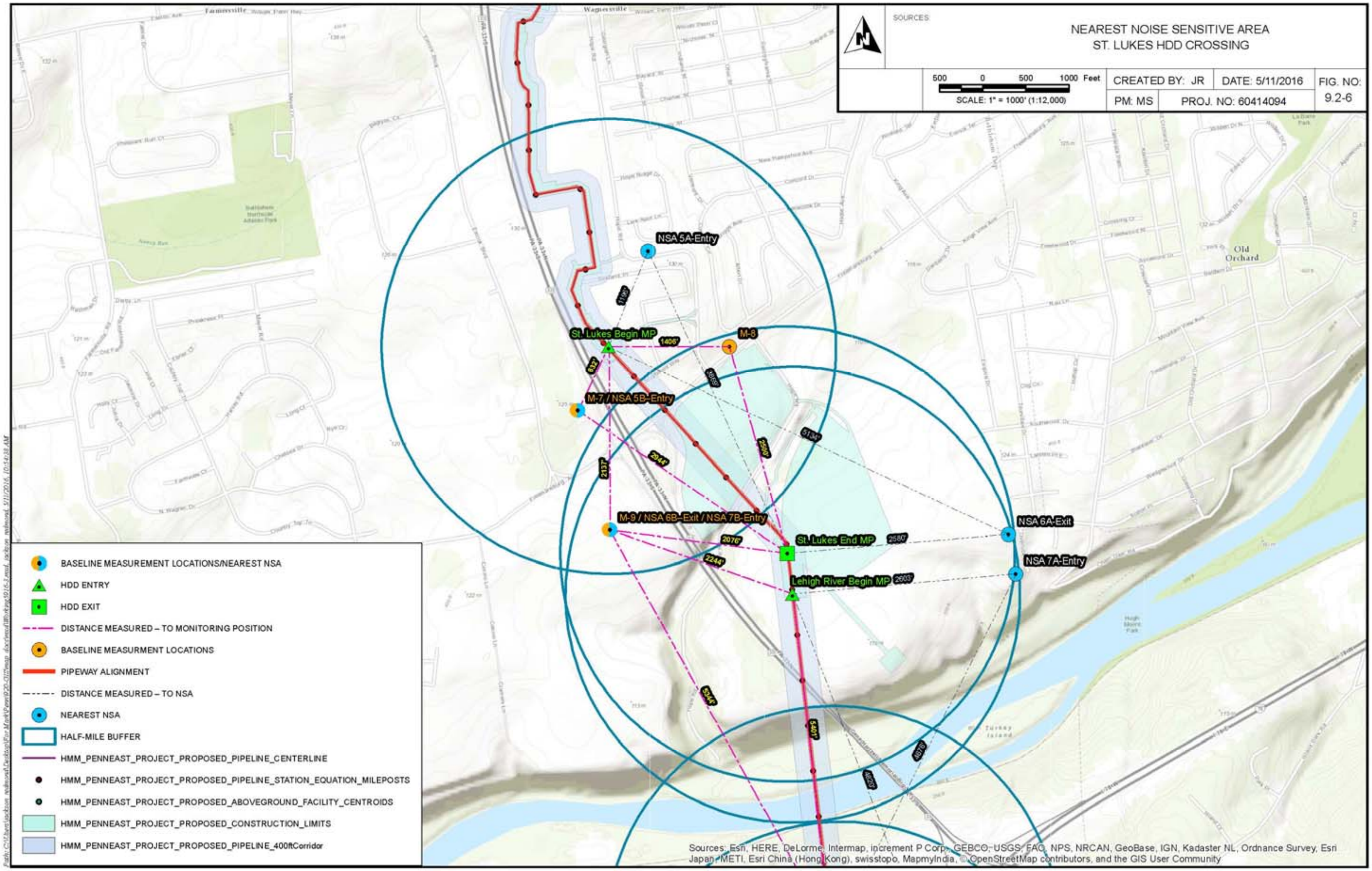

Figure 4.10.2-4 St. Lukes (Lowes) HDD Site: NSAs and Ambient Sound Level Measurement Locations

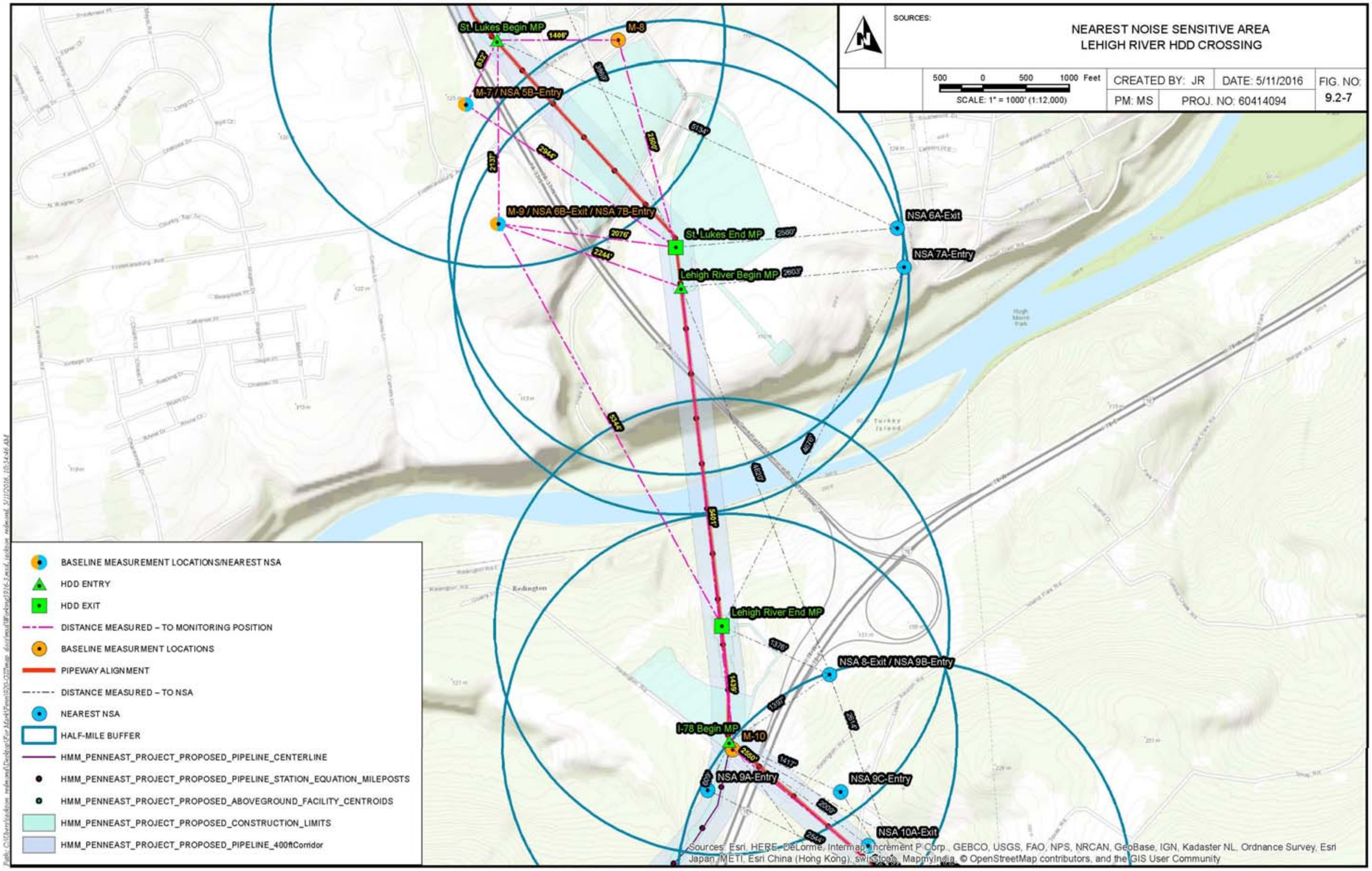

Figure 4.10.2-5 Lehigh River HDD Site: NSAs and Ambient Sound Level Measurement Locations

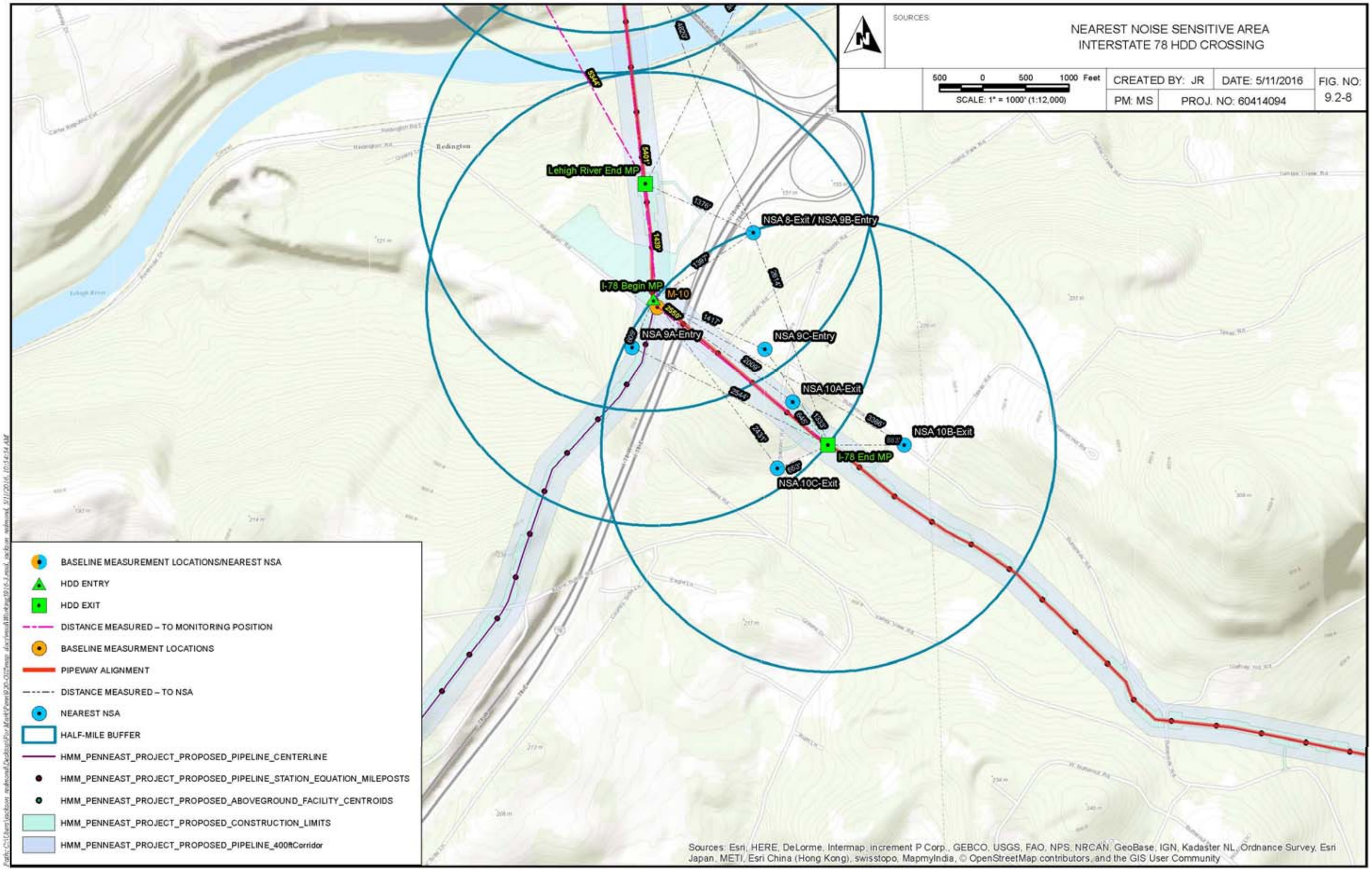

Figure 4.10.2-6 Interstate 78 HDD Site: NSAs and Ambient Sound Level Measurement Locations

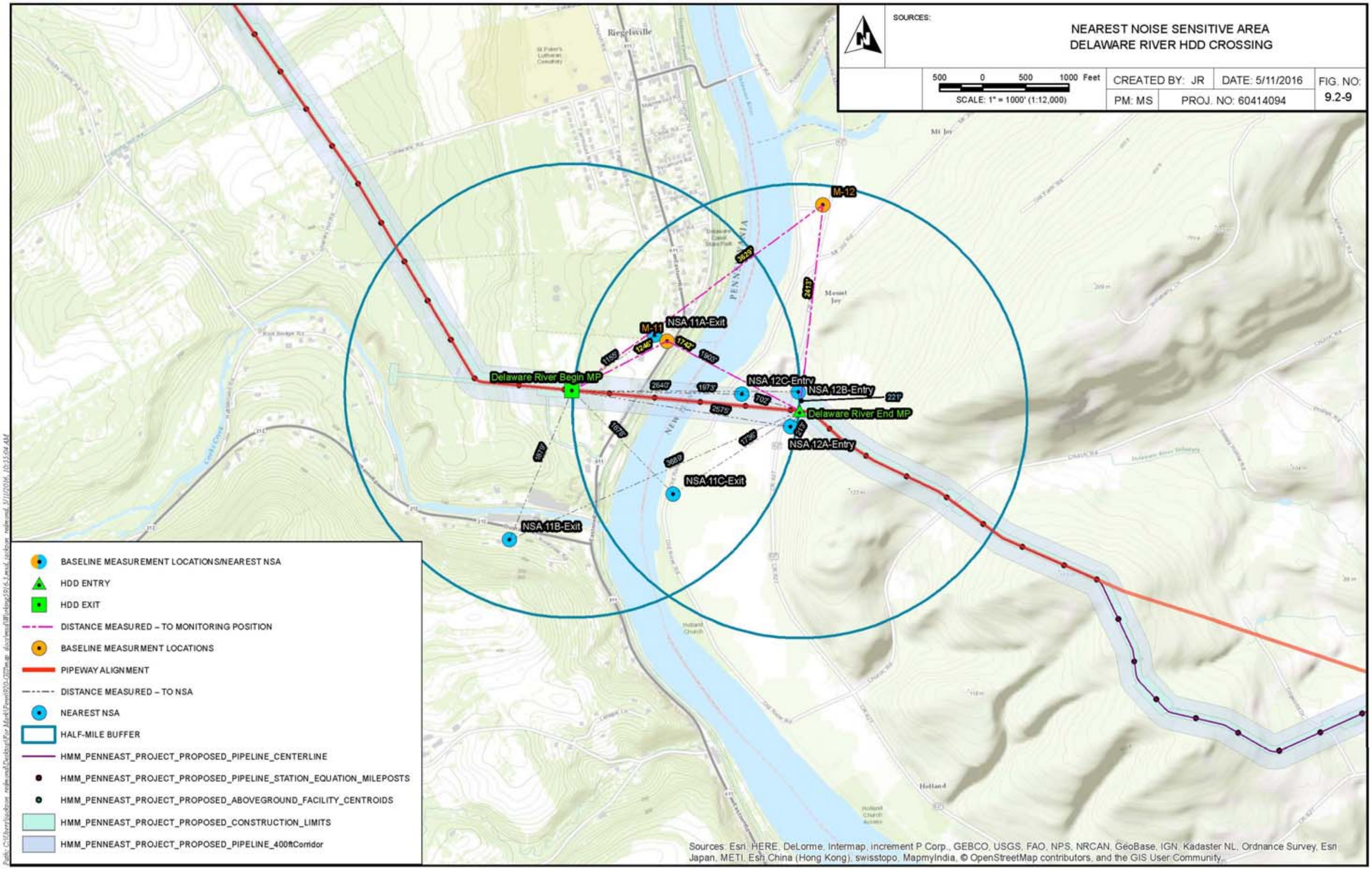

Figure 4.10.2-7 Delaware River and Canal HDD Site: NSAs and Ambient Sound Level Measurement Locations

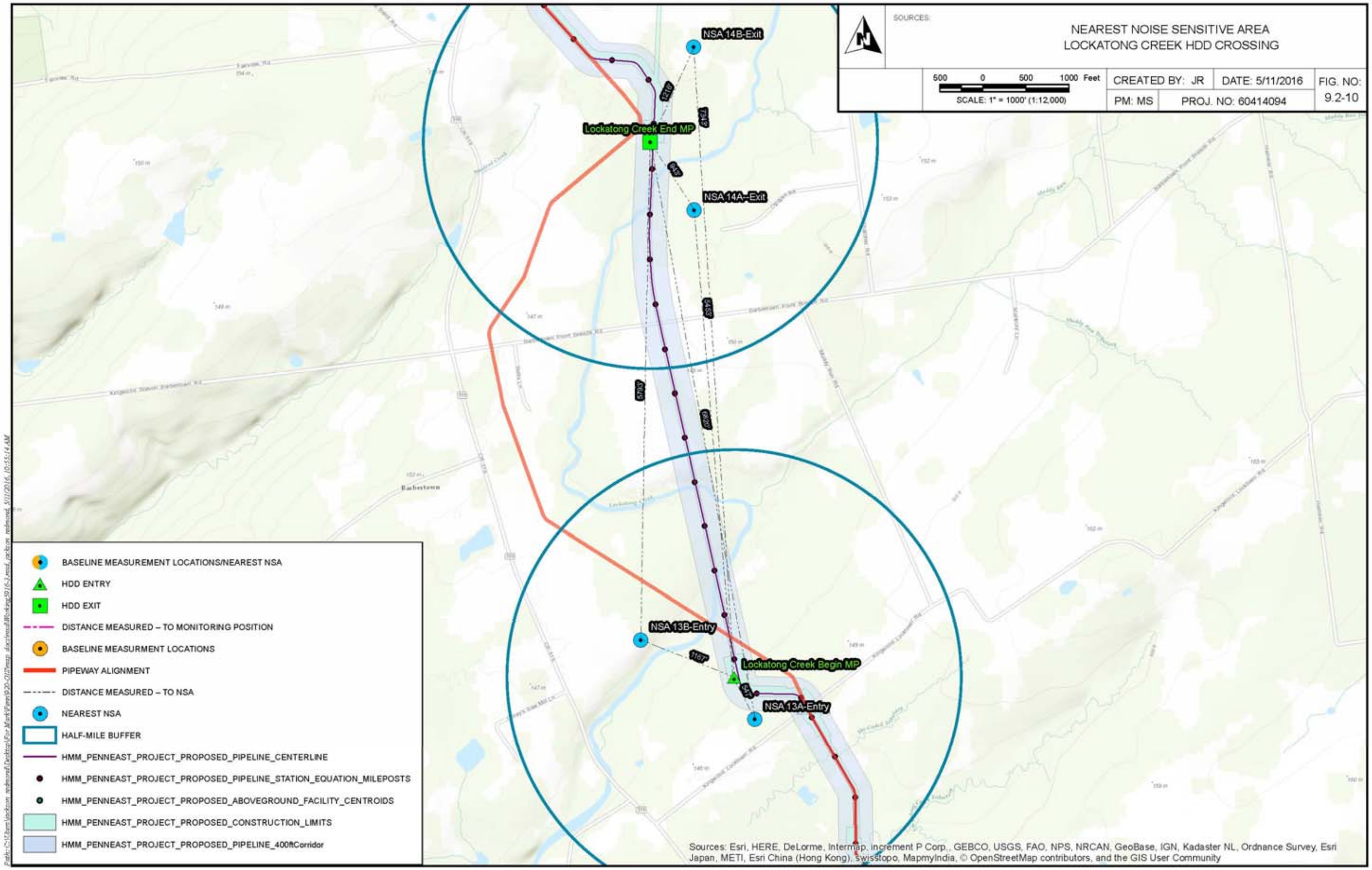

Figure 4.10.2-8 Lockatong Creek HDD Site: NSAs and Ambient Sound Level Measurement Locations

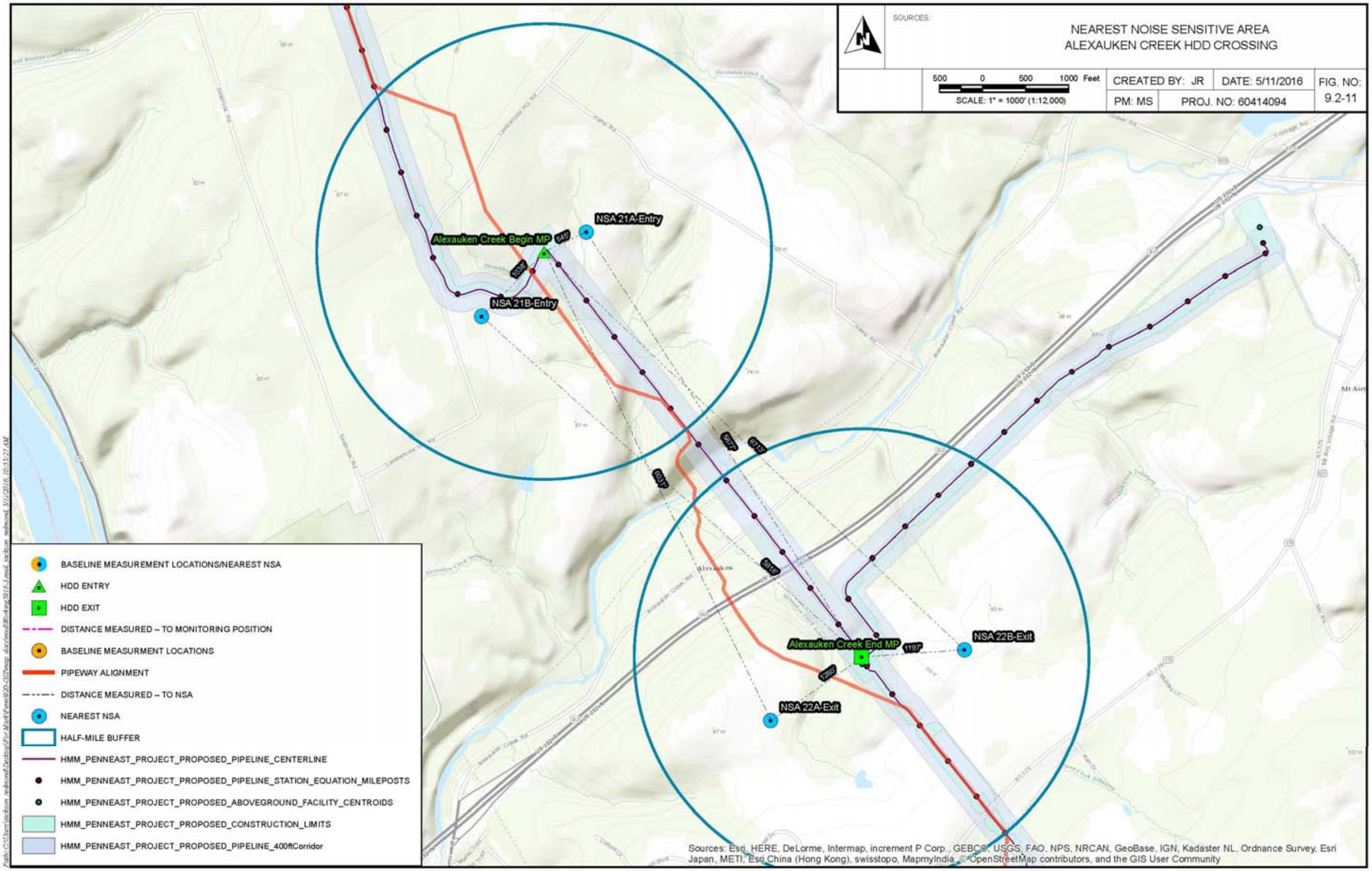

Figure 4.10.2-9 Alexauken Creek HDD Site: NSAs and Ambient Sound Level Measurement Locations

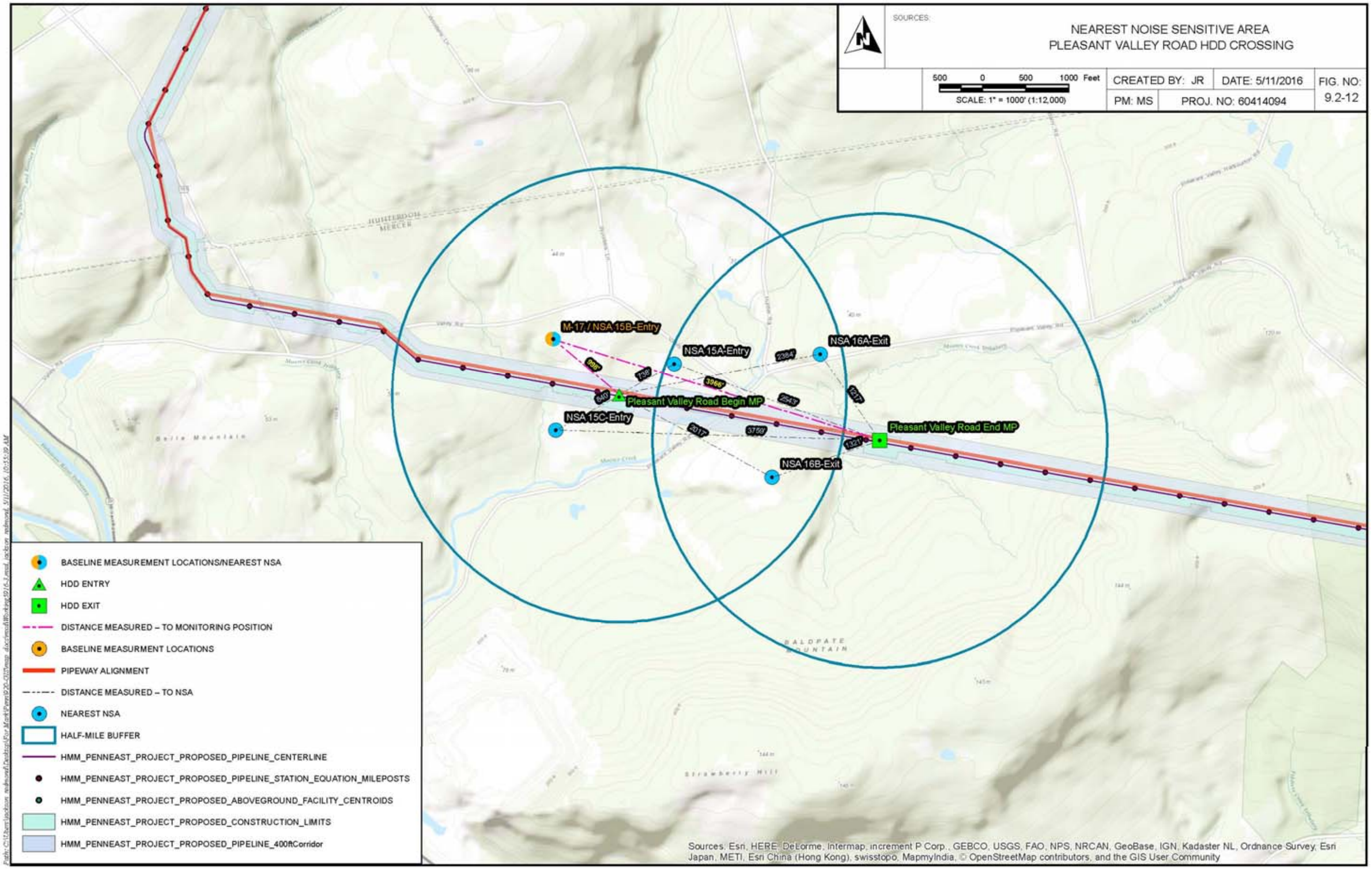

Figure 4.10.2-10 Pleasant Valley Road HDD Site: NSAs and Ambient Sound Level Measurement Locations

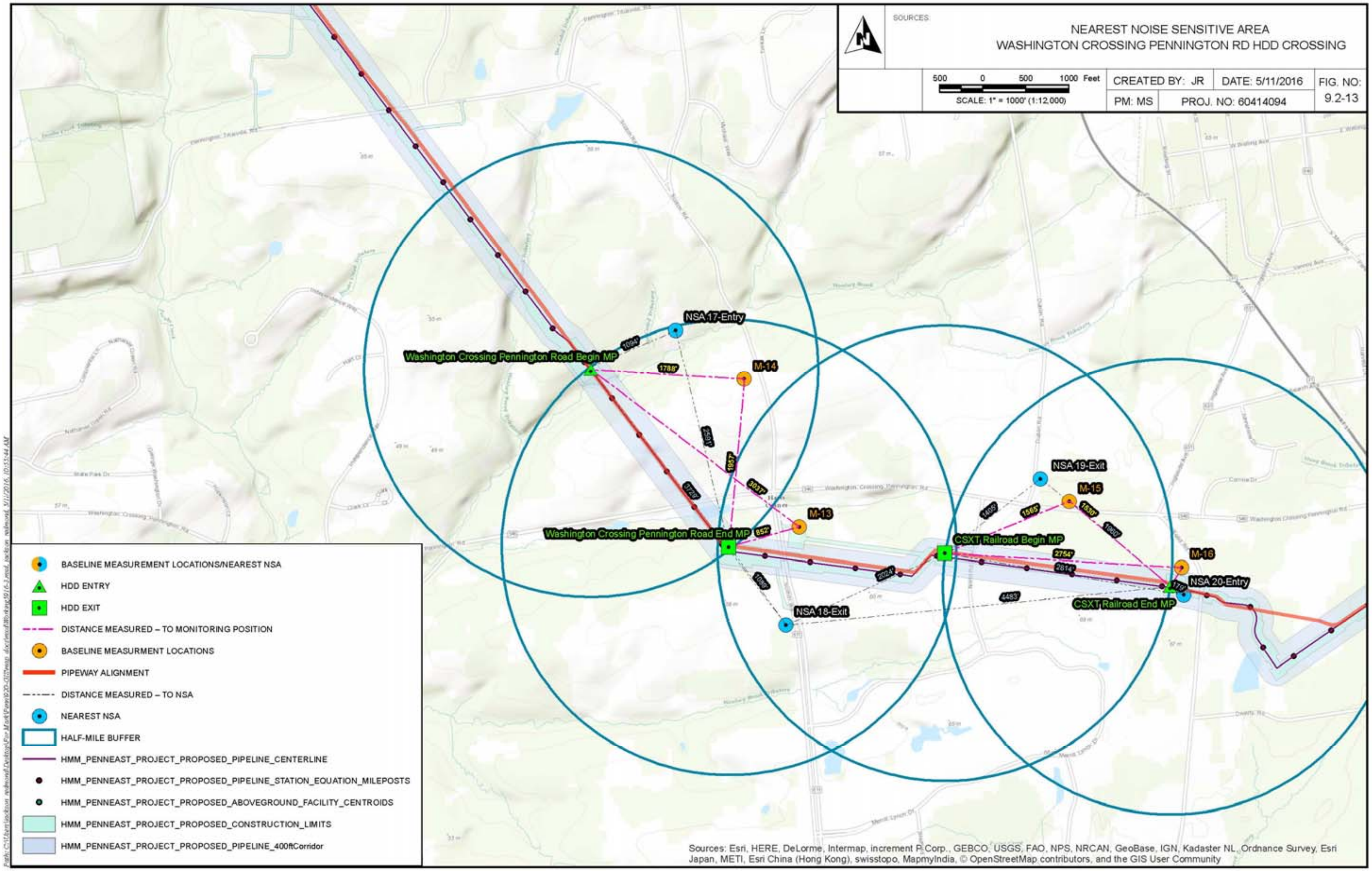

Figure 4.10.2-11 Washington Crossing Pennington Road HDD Site: NSAs and Ambient Sound Level Measurement Locations

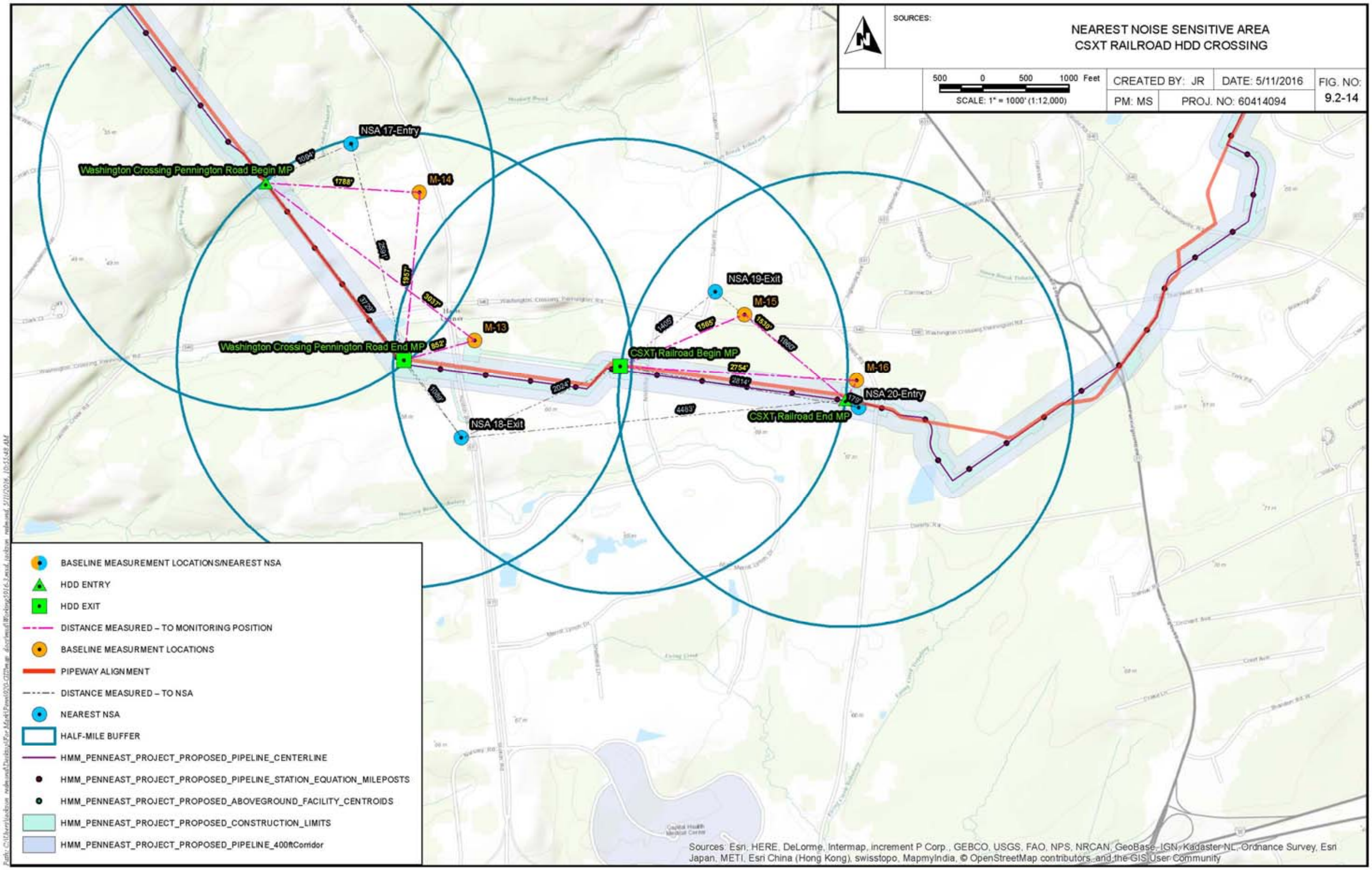

Figure 4.10.2-12 CSXT Railroad HDD Site: NSAs and Ambient Sound Level Measurement Locations

4.10.2.3 Noise Level Impacts and Mitigation

Construction Noise Analysis

Construction of the Project would require approximately six to nine months to complete. During construction activities, a varying number of construction equipment and personnel would be in the area of a given construction site or zone, resulting in varying levels of construction noise. The following subsections detail the techniques for predicting construction noise using currently anticipated rosters of equipment and expected hours of operation.

Kidder Compressor Station

Table 4.10.2-4 identifies the expected equipment and vehicles that would be involved in the construction of the compressor station. Table 4.10.2-4 provides the expected quantity of equipment/vehicles onsite, their rated power, sound power level, and utilization, which accounts for the fraction of time that the equipment is in use over the specified time period. All equipment would be used 50 percent of the time during the construction period. Construction of the compressor station is proposed to occur up to a 10-hour shift and only within daytime hours (7 a.m. to 10 p.m.).

TABLE 4.10.2-4

Compresser Station Construction Noise Sources

Offroad and On-Road Construction Equipment/Vehicle Types	Rated Power (HP)	Quantity of Equipment/ Vehicles Onsite	Sound Power Level (dBA)
Welding Rig	35	9	112
8,000-Lb All-Terrain Fork Truck	100	1	107
D-7 LGP Caterpillar or Equivalent	240	2	114
325 Caterpillar or Equivalent	180	2	112
330 Caterpillar with Vacuworks & Shoes	270	3	116
Cat Rubber Tire Backhoe	100	3	111
583 Caterpillar Pipelayer	347	1	112
594 Caterpillar Pipelayer	385	1	113
300-Ton Hydraulic Crane	296	1	111
60-Ton Mantis	240	1	111
Power Generator	35	1	102
Pick Up (Site Supervision & Inspection)	200	10	120
Pick Up (Operator Pick Ups)	200	6	118
One-Ton Truck w/ Tools	300	3	116

Table 4.10.2-5 presents the predicted aggregate compressor station construction noise and estimated change in ambient sound levels at each of three nearest NSAs to the compressor station site. The average of two days of measured ambient sound levels at baseline site IDs LT1 and LT2 were used to characterize ambient sound levels at the Econolodge and Pizza Residence, respectively. In addition, the average of two days of measured ambient sound levels at baseline site ID LT1 was used to estimate ambient sound levels at the nearest fairway of the Golf Course.

TABLE 4.10.2-5 Predicted Construction Noise - Kidder Compressor Station						
Nearby NSAs	**Distance and Direction of NSA from Comp. Building**	**Baseline Site ID**	**Ambient Sound Level (dBA, L_{dn})**	**Estimated Sound Contribution (dBA, L_{dn}) of Construction Noise**	**Cumulative Sound Level (dBA, L_{dn})**	**Change in Sound Level (dBA, L_{dn})**
Econolodge	2,310 feet north	LT1	57	58	61	4
Pizza Residence	1,920 feet north	LT2	58	60	62	4
Golf Course (nearest fairway)	3,170 feet northeast	LT1	57	55	59	2

The expected Project construction noise associated with the Kidder Compressor Station is 55 dBA L_{dn}, at the nearest Golf Course fairway, which would be compliant with our FERC threshold. Because the construction of the compressor station would not comply with the FERC threshold at the other NSAs, PennEast may evaluate and implement mitigation measures as necessary such as use of temporary noise barriers.

Other recreational areas considered for the Kidder Compressor Station noise analysis were Snow Ridge Village, Jack Frost Big Boulder Ski Area, Jack Frost National Golf Club, Hickory Run State Park, and Beltzville State Park. However, all of those recreational areas are more than one mile away from the compressor station and are therefore not expected to experience potential noise impacts associated with construction activities.

HDD

PennEast is proposing to cross Pohopoco Creek, Pohopoco Stream, and the Delaware River using the HDD boring method. The proposed equipment at the HDD entry and exit points expected to the following:

- Entry side:
  - drilling rig and engine-driven hydraulic power unit [400–750 HP (300–560 kilowatt [kW]) engine(s)];
  - triplex centrifugal main mud pumps [350–450 HP (260–340 kW) engine];
  - engine-driven electric generator sets [200–350 HP (150–260 kW) generator sets];
  - mud mixing/cleaning system (e.g., ditch pumps, mud tank pumps);
  - fluid systems shale shakers (associated with the mud mixing/cleaning system);
  - crane, boom truck, frontloader, backhoe, trackhoe, and/or forklift;
  - engine-driven light plants (if needed for nighttime operation); and
  - frac tanks (water and drilling mud storage) and storage container(s).

- Exit side:
  - backhoe, sideboom, one engine-driven generator set, and frac tank(s);
  - mud pump(s) and associated mud tank; and
  - engine-driven light plants (if needed for nighttime operation).

This analysis assumed the acoustic emission point is the geographic center of the HDD entry or exit equipment pit, depending on which is being studied in the analysis. Table 4.10.2-6 presents the composite sound power level (L_W) associated with the equipment proposed at the HDD entry and exit points on an octave band and broadband (dBA) basis.

TABLE 4.10.2-6

HDD Equipment Sound Power Level

Sound Source Location	**Unweighted (dB) Sound Power Level per Octave Band Center Frequency (Hz)**									
	31.5	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dBA**
HDD entry site equipment	118	115	112	114	112	109	108	106	98	115
HDD exit site equipment	110	108	105	102	100	98	95	92	88	103

Source: Burge & Kitech 2009

Table 4.10.2-7 presents the proposed HDD crossings, distance to the nearest NSA, and the measured or estimate ambient (L_{dn}) sound level at each crossing. Table 4.10.2-7 also shows the predicted potential noise impacts resulting from HDD activity, the cumulative sound level inclusive of ambient, and the incremental increase in sound level resulting from HDD activity.

TABLE 4.10.2-7

Estimated HDD Noise Level (L_{dn}) at NSA nearest to HDD Crossings

Nearest NSA	**HDD Crossing**	**Distances (feet) to HDD Entry / Exit**	**Baseline Site ID**	**Ambient Sound Level (L_{dn}, dBA)**	**Estimated HDD Noise Level (L_{dn}, dBA)**	**Cumulative Sound Level (dBA, L_{dn})**	**Change in Sound Level (dBA, L_{dn})**
NSA 1-Entry	US Hwy 81 / St. Hwy 315	2,900/1,500	M1	68	47	68	0
NSA 2-Exit	US Hwy 81 / St. Hwy 315	2,030/3,160	M3	58	50	59	1
NSA-3A Entry	Wild Creek & Pohopoco Creek (Beltzville Lake)	601/6,951	M4	49	63	63	14
NSA 3B-Entry	Wild Creek & Pohopoco Creek (Beltzville Lake)	1,000/7,026	M4	49	58	58	9
NSA 3C-Entry	Wild Creek & Pohopoco Creek (Beltzville Lake)	949/6,203	M4	49	58	59	10
NSA-4A Exit	Wild Creek & Pohopoco Creek (Beltzville Lake)	6,950/700	M5	43	49	50	7
NSA-4B Exit	Wild Creek & Pohopoco Creek (Beltzville Lake)	6,451/950	M5	43	46	48	5
NSA-4C Exit	Wild Creek & Pohopoco Creek (Beltzville Lake)	6,218/1,344	M5	43	43	46	3
NSA-5A Entry	St. Lukes (Lowes)	1,195/3,870	M8	66	56	66	0
NSA-5B Entry	St. Lukes (Lowes)	832/2,944	M7	65	60	66	1
NSA-6A Exit	St. Lukes (Lowes)	5,135/2,580	Est.	50	41	50	0
NSA-6B Exit	St. Lukes (Lowes)	2,137/2,076	M9	63	50	63	0
NSA-7A Entry	Lehigh River	2,605/4,675	Est.	52	47	53	1
NSA-7B Entry	Lehigh River	2,244/5,344	M9	63	49	63	0
NSA-8 Exit	Lehigh River	4,820/1,375	M10	63	44	63	0
NSA-9A Entry	Interstate 78	610/2,545	M10	63	63	66	3

TABLE 4.10.2-7 Estimated HDD Noise Level (L_{dn}) at NSA nearest to HDD Crossings							
Nearest NSA	**HDD Crossing**	**Distances (feet) to HDD Entry / Exit**	**Baseline Site ID**	**Ambient Sound Level (L_{dn}, dBA)**	**Estimated HDD Noise Level (L_{dn}, dBA)**	**Cumulative Sound Level (dBA, L_{dn})**	**Change in Sound Level (dBA, L_{dn})**
NSA-9B Entry	Interstate 78	1,397/2,614	M10	63	54	64	1
NSA-9C Entry	Interstate 78	1,417/1,333	Est.	55	54	58	3
NSA-10A Exit	Interstate 78	2,010/645	Est.	52	53	55	3
NSA-10B Exit	Interstate 78	3,366/883	Est.	47	49	51	4
NSA-10C Exit	Interstate 78	2,431/653	Est.	56	52	57	1
NSA-11A Exit	Delaware River and Canal	1,905/1,155	M11	62	52	62	0
NSA-11B Exit	Delaware River and Canal	3,689/1,879	M11	62	44	62	0
NSA-11C Exit	Delaware River and Canal	1,736/1,678	M12	53	52	56	3
NSA-12A Entry	Delaware River and Canal	215/2,575	M12	53	74	74	21
NSA-12B Entry	Delaware River and Canal	221/2,640	M12	53	74	74	21
NSA 12C-Entry	Delaware River and Canal	702/1,973	M12	53	61	62	9
NSA-13A Entry	Lockatong Creek	547/6,820	Est.	50	64	64	14
NSA-13B Entry	Lockatong Creek	1,167/5,793	Est.	39	56	56	17
NSA-14A Exit	Lockatong Creek	5,453/943	Est.	38	47	47	9
NSA-14B Exit	Lockatong Creek	7,343/1,216	Est.	36	44	44	8
NSA-21A Entry	Alexauken Creek	545/5,877	Est.	45	64	64	19
NSA-21B Entry	Alexauken Creek	1,038/5,918	Est.	48	57	58	10
NSA-22A Exit	Alexauken Creek	6,031/1,280	Est.	52	44	53	1
NSA-22B Exit	Alexauken Creek	6,713/1,197	Est.	50	61	61	11
NSA-15A Entry	Pleasant Valley Road	740/2,545	M17	43	58	58	15
NSA-15B Entry	Pleasant Valley Road	1,000/3,866	M17	43	60	60	17
NSA-15C Entry	Pleasant Valley Road	840/3,759	M17	43	49	50	7
NSA-16A Exit	Pleasant Valley Road	2,385/1,215	M17	43	51	51	8
NSA-16B Exit	Pleasant Valley Road	2,017/1,321	M17	43	57	57	14
NSA 17-Entry	Washington Crossing Pennington Road	1,095/2,590	M14	57	47	60	0
NSA 18-Exit	Washington Crossing Pennington Road	3,730/1,090	M13	60	47	60	0
NSA-19 Exit	CSXT Railroad	1,960/1,405	M15	57	51	58	1
NSA-20 Entry	CSXT Railroad	180/2,815	M16	59	76	76	17

There are several instances as shown in table 4.10.2-7 where HDD activities may be nearby but the expected change in sound level at an NSA would be minimal. These instances are at NSA locations with elevated ambient sound levels and are a sufficient distance from HDD activities that the elevated ambient sound level is dominant relative to the noise generated by HDD.

As shown above, the estimated HDD noise would exceed the FERC 55 dBA L_{dn} noise criterion at 18 NSAs. For each NSA, PennEast would evaluate and implement noise mitigation measures as necessary, which may include installation of temporary noise barriers. Additionally, due to the relative short duration of HDD activity (i.e., usually up to only several days duration) PennEast would also consider, on a case by case basis, offering compensation to the occupant(s) of an NSA or offering temporary relocation (i.e., hotel accommodations during the HDD activity. To ensure that the HDD noise does not become significant, **we recommend that:**

- **Prior to construction, PennEast should file with the Secretary, for review and written approval by the Director of the OEP, a HDD noise mitigation plan to reduce the projected noise level attributable to the proposed drilling operations at the 18 NSAs with the predicted noise levels above 55 dBA L_{dn}. During drilling operations, PennEast should implement the approved plan, monitor noise levels, include the noise monitoring results in its weekly status reports, and make all reasonable efforts to restrict the noise attributable to the drilling operations to no more than 55 dBA L_{dn} at the NSAs.**

Pipeline Construction

Potential noise impacts associated with pipeline construction were assessed based on construction phase. At a distance of approximately 3,300 feet, noise from all activities is expected to comply with the FERC 55 dBA L_{dn} threshold; thus, any potential NSA beyond this distance would not be expected to be impacted.

For NSAs that are closer to the construction activity, such as the Econolodge, Pizza Residence, and Golf Course, mitigation may be needed depending on the construction activity. The Econolodge is approximately 580 feet from construction and received sound levels are expected to range from 62 dBA during pipeline coating to 72 dBA during both the ditch and pad and cleanup phases of construction. The Pizza Residence is approximately 120 feet from construction and received sound levels are expected to range from 76 dBA during pipeline coating to 86 dBA during both the ditch and pad and cleanup phases of construction. The Golf Course is approximately 1,500 feet from construction and received sound levels are expected to range from 53 dBA during pipeline coating to 63 dBA during both the ditch and pad and cleanup phases of construction.

Depending on listener proximity to the Project right-of-way experiencing activity, pipeline construction noise may also be audible to recreationists enjoying hunting, hiking, and other allowable activities within Hickory Run State Park and Beltzville State Park. PennEast would post notices on existing information sources for Hickory Run State Park and Beltzville State Park so that potential visitors and employees of those two parks would be advised of the anticipated construction periods.

The proposed pipeline would cross only the eastern-most portions of Hickory Run State Park, on which established hiking trails and the Boulder Field Natural Area seem to generally be at least 2,000 feet away from expected construction activities along the pipeline route. At this distance, predicted construction noise levels may range from 50-60 dBA L_{dn} depending on activity. Because this portion of the park is east of Interstate Highway 476 and south of Interstate 80, there may be portions of hiking trails and other recreationist-visited areas that are already exposed to persistent roadway traffic noise of at least 50 dBA. Hence, the need for potential noise mitigation implementation would need to consider factors such as the temporary nature of the pipeline construction process and its relative "mobility" (i.e., it would traverse the vicinity as the pipeline right-of-way as it is being completed). For areas of the park where the existing ambient noise level may already exceed 50 dBA $_{Ldn}$, the benefit of noise mitigation options like temporary barrier installations would—at the receiver-to-activity distance of approximately 2,000 feet—only help reduce the net increase over ambient to a lower degree.

Similarly, pipeline construction noise may also be audible to visitors within the eastern end of Beltzville State Park. Near Beltzville State Park, the pipeline would cross under much of the eastern end of the park via HDD crossing. At the HDD equipment entry site and adjoining staging area location, noise mitigation options such as usage of temporary noise barriers could be considered and implemented.

Blasting

Blasting may be necessary in order to excavate the trench through rock strata for pipeline installation. The estimated noise level from blasting activity can be derived from the Federal Highway Administration Roadway Construction Noise Model User's Guide (FHWA 2006). It describes that the maximum noise level at 50 feet (15 meters) from blasting would be 94 dBA. While this is a relatively high noise level, and likely to be heard at considerable distances from the detonation point, it is a short duration as compared to rock removal methods, such as using track rig drills, rock breakers, jack hammers, rotary percussion drills, core barrels, and/or rotary rock drills. Blasting activity noise also depends on the blasting plan and individual blast design features or characteristics such as confinement, charge weight, detonation timing and delay, and orientation.

We received a comment that the Project should address the potential noise impacts on wildlife during Project construction and operation. Research has demonstrated various reaction of wildlife to noise. However, specific studies to determine impacts on wildlife from typical pipeline construction noises have not been conducted. Research has recorded wildlife reaction to activities that could produce similar reactions from noise associated with pipeline construction activities, such as roadway traffic, airplanes, and blasting. With PennEast's commitment to implement the mitigation measures described above, we find that impacts on wildlife due to construction noise would be spatially localized, temporary, and of short duration, and that noise from operation of the Project would not have a significant impact on local wildlife.

Vibration

PennEast conducted a vibration analysis and potential vibration effects during Project construction were also reviewed. Determining vibration effects requires a comparison of predicted vibration levels with established criteria at a sensitive location, or at a distance from the vibration source at which a predicted level would exceed the criteria. According to Federal Transit Administration (FTA) guidance, the threshold for residences (or other land uses where people may sleep) is 72 vibration decibels (VdB) of vibration velocity. Also according to FTA, a large bulldozer (representing the kind of construction equipment anticipated) can exhibit 87 VdB at a reference distance of 25 feet. It was determined that beyond a distance of 80 feet vibration levels would be below the FTA guidance threshold. Since most potential NSAs would be further than 80 feet away from the nearest construction site, construction vibration would not be expected to cause a significant impact.

Operations Noise Analysis

Kidder Compressor Station Operations

Operational noise from the Kidder Compressor Station was evaluated based on the ISO 9613-2:1996 outdoor noise propagation calculation standard (ISO 1996). PennEast is proposing to install three Solar Turbines, Model Mars 100 rated at 15,214 HP full-load output power.

Final design would be inclusive of a number of noise mitigation measures which may include the following:

- **Compressor Station Building Structure**. The building housing the turbine packages will be acoustically insulated. In addition, all doors, windows, and vent louvers will be acoustically treated.
- **Turbine Air Intake System**. If possible, the inlet silencer will be located inside of the compressor building. If the inlet silencer is not located inside the compressor building then the inlet ductwork between the silencer and the exterior building wall may be acoustically lagged. The most effective and recommended method to silence the engine air intake system is to employ an absorptive-type silencer in-line with the air intake piping (i.e., inside the building) with the air intake filter located outside of the building.
- **Turbine Exhaust System**. The turbines will be equipped with exhaust silencers. If located outside, the breach stack and muffler may be covered and/or lagged to achieve adequate transmission, if determined to be required during final design.
- **Building Ventilation**. All building ventilation openings including roof gravity relief exhausts should include standard acoustical louvers or silencers. The actual performance requirements of the silencers will depend on the size, number, and type of ventilation fans used in the final design. The sound pressure level target should be the primary design criterion, as it can be field-tested after installation.

Final design is may incorporate different mitigation in order to achieve the same objective. Under full load conditions, operational sound from the Kidder Compressor Station was modeled inclusive of noise control measures. Results are tabulated at nearby NSAs in table 4.10.2-8, which contains a comparison of the calculated levels with existing levels, the combined future levels, and the expected net increase. . The modeling results indicate that the calculated sound levels resulting from compressor station operation at the NSAs would be below the FERC required L_{dn} of 55 dBA. The expected increases in noise levels at the NSAs around the compressor station sites are shown to be negligible.

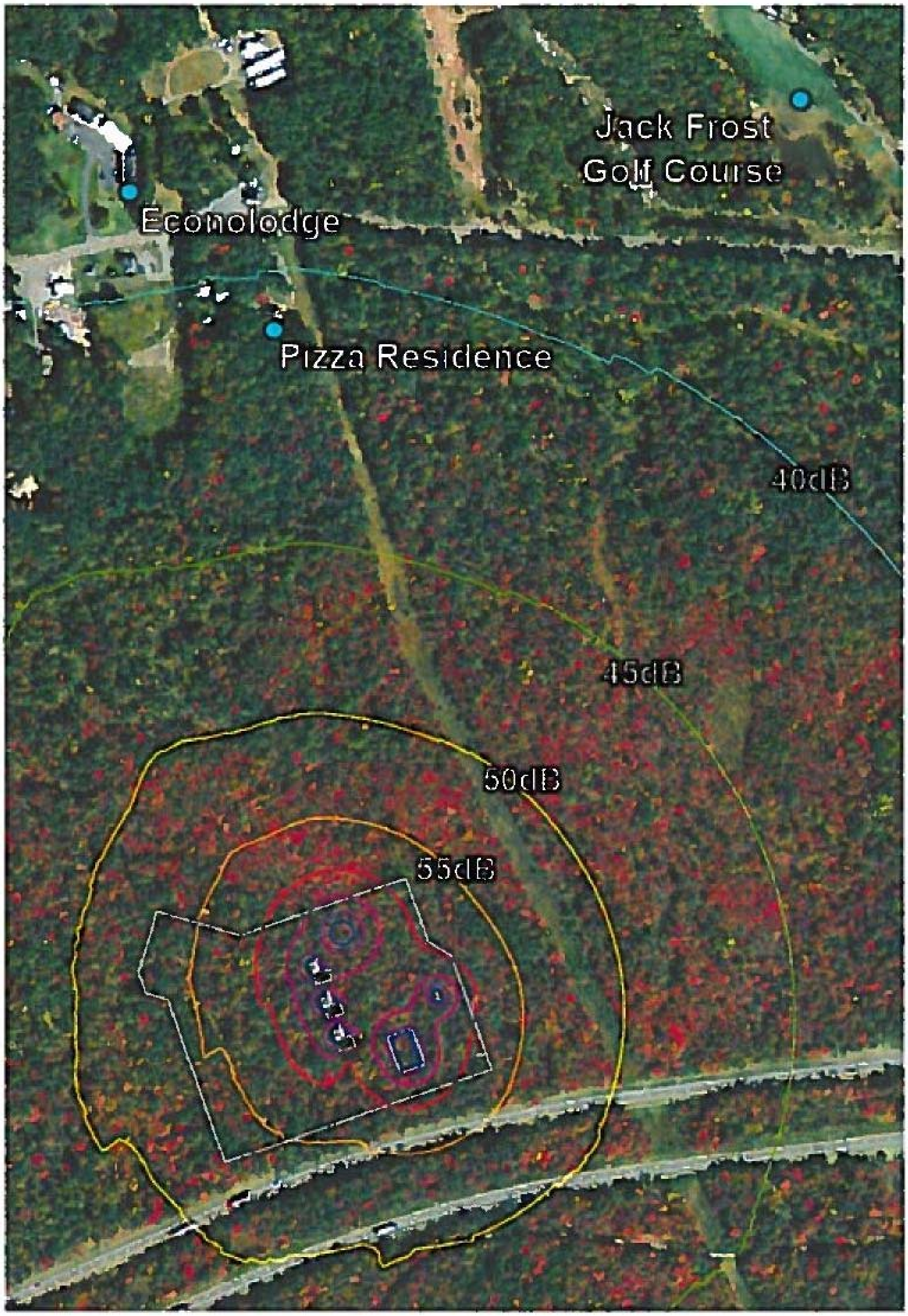

Figure 4.10.2-13 Received Sound Levels: Kidder Compressor Station Operation

TABLE 4.10.2-8

Summary of Noise Quality Analysis - Kidder Compressor Station

Nearby NSAs	Distance and Direction of NSA from Comp. Building	Ambient Sound Level (dBA, L_{dn})	Estimated Sound Contribution (dBA, L_{dn}) of the Compressor Station	Cumulative Estimated Sound Level (dBA, L_{dn}) after Installation of the Compressor Building	Change in Sound Level (dBA, L_{dn})
Econolodge (LT1)	2,310 feet north	57	46	57	0
Pizza Residence (LT2)	1,920 feet north	58	48	58	0
Golf Course (nearest fairway)	3,170 feet northeast	57 a/	43	57	0

Note:
a/ Not measured during field survey, but conservatively assumed similar to that of LT1.

Ambient sound levels in the vicinity of the NSAs identified in table 4.10.2-8 are elevated due to nearby traffic-related noise. Ambient sound level measurement location LT1 was located approximately 250 feet north of Route 940 and one of the primary contributing sound sources was traffic noise from Interstate-80. Similarly, LT2 was located approximately 210 feet south of Route 940 and one of the primary contributing sound sources was traffic noise from Interstate-80. To ensure that the actual noise produced at the compressor station is not significant, **we recommend that:**

- **PennEast should file a noise survey with the Secretary no later than 60 days after placing the Kidder Compressor Station in service. If a full load noise condition survey is not possible, PennEast should provide an interim survey at the maximum horsepower load and provide the full load survey within six months. If the noise attributable to the operation of the compressor station at full load exceeds an L_{dn} of 55 dBA at any nearby NSA, PennEast should file a report on what changes are needed and should install the additional noise controls to meet the level within one year of the in-service date. PennEast should confirm compliance with the above requirement by filing a second noise survey with the Secretary no later than 60 days after it installs the additional noise controls.**

Vibration

The Solar Turbines Model Mars 100 turbines proposed for the new Kidder Compressor Station are typically engineered and designed to operate with very low levels of vibration, thus helping to ensure nominal operation over the system's design life. Under normal operating conditions, perceptible vibration from compressor station operation at the nearest NSAs (LT1 and LT2) is not anticipated due to ground-borne attenuation that would occur naturally with distance through the existing variety of geologic strata and soils that are present.

Blowdown Operations

Compressor unit blowdown would occur occasionally as part of normal compressor station operation and maintenance. It is anticipated that blowdowns at the Kidder Compressor Station would occur up to twice per day, and each last no more than five minutes per vent. The reference noise level from these vents, which reduce as venting decreases in pressure, is expected to be 50 dBA at a distance of 300 feet. Typical noise from these blowdown events would be temporary and short duration.

For pipeline maintenance, blowdown events may be longer in duration but are still temporary and would occur far less frequently. PennEast would notify NSAs and their neighboring communities of any blowdown events in advance of the event.

Mainline Valves

Noise from MLV sites is typically associated with emergency or maintenance blowdown events. Blowdowns are required for certain maintenance activities and are performed between MLVs and not for the entire pipeline. Blow-off valves are provided with each MLV setting so that each section of pipeline between MLVs can be depressurized. Due to the infrequency and short duration of the blowdown events, noise impacts are expected to be minimal. However, to ensure that potential noise impacts on NSAs are minimized, **we recommend that:**

- **Prior to the end of the draft EIS comment period, PennEast should file with the Secretary proposed mitigation measures to minimize noise levels associated with emergency or maintenance MLV blowdown events. Mitigation measures may include but not be limited to use of a silencer, restricting maintenance blowdowns to daytime hours only, and/or notifying landowners in the immediate area of the planned blowdown event.**

With typical noise control and sound abatement means in place, such as external acoustical lagging on the aboveground piping and valve components, recommended aboveground levels for such stations would not be expected to exceed 85 dBA at 3 feet, which is an oft-cited OSHA-related specification (29 CFR Part 1910, Subpart G). Project MLVs would have similar means in-place to attenuate aboveground noise. Table 4.10.2-9 presents the estimated L_{dn} associated with the nearest NSAs identified for each of eleven MLV locations, with the exception of MLV-5.

As shown in table 4.10.2-9, the predicted MLV noise is not expected to exceed the FERC threshold of 55 dBA L_{dn} at the nearest NSAs; therefore, no noise mitigation is required.

TABLE 4.10.2-9

Estimated MLV Noise Level (L_{dn}) at nearest NSAs

MLV	Distance (feet) to NSA, direction	Nearest NSA Street Address	Ambient Sound Level (L_{dn}, dBA) a/	Estimated MLV Noise Level (L_{dn}, dBA) b/	Total Estimated Ambient Sound Level (dBA, L_{dn}) c/	Change in Sound Level (dBA, L_{dn}) d/
MLV-1	130, E	9 E. Saylor Ave., Wilkes-Barre, PA	46	52	53	7
MLV-1	160, NNW	3 E. Saylor Ave, Wilkes-Barre, PA	51	50	54	3
MLV-2	200, NE	Shades Glen Read, Wilkes-Barre, PA	49	49	52	3
MLV-2	2300, W	Rabbit Run Lane, Wilkes-Barre, PA	39	27	40	0
MLV-3	240, ENE	Rte 534 (between Maynard Rd. and N. Old Stage Rd.), Albrightsville, PA	53	47	54	1
MLV-3	320, NNE	Rte 534 (between Maynard Rd. and N. Old Stage Rd.), Albrightsville, PA	55	44	55	0

TABLE 4.10.2-9 Estimated MLV Noise Level (L_{dn}) at nearest NSAs						
MLV	Distance (feet) to NSA, direction	Nearest NSA Street Address	Ambient Sound Level (L_{dn}, dBA) a/	Estimated MLV Noise Level (L_{dn}, dBA) b/	Total Estimated Ambient Sound Level (dBA, L_{dn}) c/	Change in Sound Level (dBA, L_{dn}) d/
MLV-4	560, E	Stagecoach Rd. E, Palmerton, PA	37	40	41	4
MLV-4	600, NE	Church Road, Palmerton, PA	37	39	41	4
MLV-6	475, NE	3056 Mountain View Drive, Bath, PA	54	41	55	0
MLV-6	300, W	3099 Mountain View Drive, Bath, PA	58	45	58	0
MLV-7	210, E	3141 Bath Pike, Bath, PA	60	48	60	0
MLV-7	215, NE	2917 Penn Men Rd, Nazareth, PA	58	48	59	0
MLV-8	650, SSE	2660 Reddington Rd., Hellertown PA	60	38	60	0
MLV-9	570, NE	266 Riegelsville Milford Rd., Milford, NJ	60	39	60	0
MLV-10	400, W	181 Spring HUI ,Road, Frenchtown NJ	49	43	50	1
MLV-10	1400, ESE	153 Spring Hill Road, Frenchtown, NJ	45	32	45	0
MLV-11	1200, E	Route 179, West Armwell Township, Hunterdon, NJ	46	33	46	0

Notes:
a/ Estimated existing ambient noise level - the pre-Project outdoor ambient noise level, estimated with an FTA-based algorithm that evaluates noise contribution based the NSA's distance to nearest street, highway and freeway. In one case, distance to an existing nearby industrial facility was also part of the estimation.
b/ Estimated MLV noise level - a prediction of the MLV aboveground noise, using 85 dBA at three feet as a reference value and treating the noise as a point source.
c/ Future estimated ambient sound level with MLV - this is the log-sum of #1 and #2, yielding a future ambient noise level that includes the MLV noise contribution.
d/ Change in ambient level - this is an arithmetic difference of #3 minus #1, yielding how much higher the future ambient noise level is compared to the estimated existing ambient.

Metering (Interconnect) Stations

PennEast has not filed operational noise estimates for meter stations at this time, as it has not completed meter station designs pending vendor specifications. However, we believe that noise estimates should be completed using typical or representative meter station equipment and designs. Therefore, **we recommend that:**

- **Prior to the end of the draft EIS comment period, PennEast should file with the Secretary a complete noise analysis of the Project metering (interconnect) stations using the best available typical design or vendor specification with regards to impacts on the closest identified residences/NSA as shown in table 4.10.2-10.**

In terms of potential noise impacts of Project metering stations, table 4.10.2-10 identifies the location of nearest NSAs.

TABLE 4.10.2-10

Location of Nearest NSAs

Metering (Interconnect) Stations	Closest Identified Residences/NSA (feet)
Wyoming Interconnect	900
Springville Interconnect	1200
Auburn and Leidy Interconnects	500
Blue Mountain Interconnect/MLV-5	3000
Elizabethtown and Gilbert Interconnects	650
Algonquin and TETCO Interconnects	1200
Transco Interconnect	500

4.11 RELIABILITY AND SAFETY

The transportation of natural gas by pipeline involves some incremental risk to the public due to the potential for an accidental release of natural gas. The greatest hazard is a fire or explosion following a major pipeline rupture.

Methane (CH_4), the primary component of natural gas, is colorless, odorless, and tasteless. It is not toxic, but is classified as a simple asphyxiate, possessing a slight inhalation hazard. If breathed in high concentration, oxygen deficiency can result in serious injury or death.

CH_4 has an auto-ignition temperature of 1,000°F and is flammable at concentrations between 5.0 percent and 15.0 percent in air. An unconfined mixture of CH_4 and air is not explosive; however, it may ignite if there is an ignition source. A flammable concentration within an enclosed space in the presence of an ignition source can explode. It is buoyant at atmospheric temperatures and disperses rapidly in air.

4.11.1 Safety Standards for Pipelines

The DOT is mandated to provide pipeline safety under 49 U.S.C. 601. The DOT's PHMSA administers the national regulatory program to ensure the safe transportation of natural gas and other hazardous materials by pipeline. PHMSA develops safety regulations and other approaches to risk management that ensure safety in the design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. Many of the regulations are written as performance standards, which set the level of safety to be attained and allow the pipeline operator to use various technologies to achieve safety.

The PHMSA ensures that people and the environment are protected from the risk of pipeline incidents. This work is shared with state agency partners and others at the federal, state, and local level. The DOT provides for a state agency to assume all aspects of the safety program for intrastate facilities by adopting and enforcing, at a minimum, the federal standards. A state may also act as DOT's agent to inspect interstate facilities within its boundaries; however, the DOT is responsible for enforcement actions. PHMSA federal inspectors perform inspections on interstate natural gas pipeline facilities in Pennsylvania and New Jersey. The DOT pipeline standards are published in 49 CFR 190-199. Part 192 specifically addresses the minimum federal safety standards for transportation of natural gas by pipeline.

Under a Memorandum of Understanding on Natural Gas Transportation Facilities (Memorandum) dated January 15, 1993, between the DOT and FERC, DOT has the exclusive authority to promulgate federal safety standards used in the transportation of natural gas. Section 157.14(a)(9)(vi) of FERC's regulations requires that an applicant certify that it would design, install, inspect, test, construct, operate, replace, and maintain the facility for which a Certificate is requested in accordance with federal safety standards and plans for maintenance and inspection, or certify that it has been granted a waiver of the requirements of the safety standards by the DOT in accordance with Section 3(e) of the Natural Gas Pipeline Safety Act. FERC accepts this certification and does not impose additional safety standards other than DOT standards. If the Commission becomes aware of an existing or potential safety problem, there is a provision in the Memorandum to promptly alert the DOT. The Memorandum also provides for referring complaints and inquiries made by state and local governments, as well as the general public, involving safety matters related to pipelines under the Commission's jurisdiction. The FERC also participates as a member of DOT's Technical Pipeline Safety Standards Committee, which determines if proposed safety regulations are reasonable, feasible, and practicable.

The pipeline and aboveground facilities associated with the Project must be designed, constructed, operated, and maintained in accordance with DOT Minimum Federal Safety Standards in 49 CFR 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. The DOT specifies material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion.

The DOT also defines area classifications, based on population density in the vicinity of pipeline facilities, and specifies more rigorous safety requirements for populated areas. The class location unit is an area that extends 220 yards on either side of the centerline of any continuous 1-mile length of pipeline. The four area classifications are defined below:

- Class 1 – Location with 10 or fewer buildings intended for human occupancy;
- Class 2 – Location with more than 10 but less than 46 buildings intended for human occupancy;
- Class 3 – Location with 46 or more buildings intended for human occupancy or where the pipeline lies within 100 yards of any building, or small well-defined outside area occupied by 20 or more people on at least 5 days a week for 10 weeks in any 12-month period.; and
- Class 4 – Location where buildings with four or more stories aboveground are prevalent.

Class locations representing more populated areas (e.g., Class 2, 3 and 4) require higher safety factors in pipeline design, testing, and operation. For example, pipelines constructed on land in Class 1 locations must be installed with a minimum depth of cover of 30 inches in normal soil and 18 inches in consolidated rock. Class 2, 3, and 4 locations, as well as drainage ditches of public roads and railroad crossings, require a minimum cover of 36 inches in normal soil and 24 inches in consolidated rock. However, PennEast has indicated that they would install pipes rated for Class 2 standards in all Class 1 locations in order to increase safety.

Class locations also specify the maximum distance to a sectionalizing block valve (i.e., 10.0 miles in Class 1, 7.5 miles in Class 2, 4.0 miles in Class 3, and 2.5 miles in Class 4 locations). Pipe wall thickness and pipeline design pressures; hydrostatic test pressures; maximum allowable operating pressure (MAOP); inspection and testing of welds; and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas. Class locations for the Project have been determined based on the relationship of the pipeline centerline to other nearby structures and manmade features. Appendix G-20 summarizes the class locations for the Project facilities.

If a subsequent increase in population density adjacent to the right-of-way results in a change in class location for the pipeline, PennEast would reduce the MAOP or replace the segment with pipe of sufficient grade and wall thickness, if required to comply with DOT requirements for the new class location.

The DOT Pipeline Safety Regulations require operators to develop and follow a written Integrity Management Program that contain all the elements described in 49 CFR 192.911 and address the risks on each transmission pipeline segment. Specifically, the rule establishes an integrity management program that applies to all high-consequence areas (HCA).

The DOT has published rules that define HCAs where a gas pipeline accident could do considerable harm to people and their property and requires an integrity management program to minimize the potential for an accident. This definition satisfies, in part, the Congressional mandate for DOT to prescribe standards that establish criteria for identifying each gas pipeline facility in a high-density population area.

The HCAs may be defined in one of two ways. In the first method, an HCA includes:

- current Class 3 and 4 locations;
- any area in Class 1 or 2 where the potential impact radius[23] is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle[24]; or
- any area in Class 1 or 2 where the potential impact circle includes an identified site.

An "identified site" is an outside area or open structure that is occupied by 20 or more persons on at least 50 days in any 12-month period; a building that is occupied by 20 or more persons on at least 5 days a week for any 10 weeks in any 12-month period; or a facility that is occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate.

In the second method, an HCA includes any area within a potential impact circle that contains:

- 20 or more buildings intended for human occupancy; or
- an identified site.

Once a pipeline operator has determined the HCAs along its pipeline, it must apply the elements of its integrity management program to those sections of the pipeline within the HCAs. DOT regulations specify the requirements for the integrity management plan in Subpart O of Part 192, Gas Transmission Pipeline Integrity Management.

Appendix G-21 lists the HCAs for the Project, which have been determined based on the relationship of the pipeline centerline to nearby structures and identified sites. No HCAs were identified within the potential impact radius (within 943 feet) established for the Kidder Compressor Station.

The pipeline and aboveground facilities would be designed, constructed, operated, and maintained in accordance with the DOT's Minimum Federal Safety Standards in 49 CFR 192. The general construction methods that PennEast would implement to ensure the safety of the Project are described in section 2.3 including welding, inspection, and integrity testing procedures. PennEast has indicated that they would build the Project to exceed certain aspects of the DOT's Minimum Federal Safety Standards, such as:

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[23] The potential impact radius is calculated as the product of 0.69 and the square root of the MAOP of the pipeline in pounds per square inch (gauge) multiplied by the square of the pipeline diameter in inches.
[24] The potential impact circle is a circle of radius equal to the potential impact radius.

- Class 2 pipe would be installed in all Class 1 locations in order to increase safety;
- nondestructive inspection would be conducted for 100 percent of the mainline welds in all areas (e.g., 49 CFR 192 only requires that 10 percent of the welds be tested in Class 1 locations); and
- prior to placing the pipeline into service, the pipe would be hydrostatically tested at a maximum pressure that exceeds industry standards identified in 49 CFR 192.

The DOT prescribes the minimum standards for operating and maintaining pipeline facilities, including the requirement to establish a written plan governing these activities. Each pipeline operator is required to establish an emergency plan that includes procedures to minimize the hazards in a natural gas pipeline emergency. Key elements of the plan include procedures for:

- receiving, identifying, and classifying emergency events, gas leakage, fires, explosions, and natural disasters;
- establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response;
- emergency system shutdown and safe restoration of service;
- making personnel, equipment, tools, and materials available at the scene of an emergency; and
- protecting people first and then property, and making them safe from actual or potential hazards, including evacuating individuals and rerouting traffic as necessary to avoid any area that is deemed to be unsafe.

The DOT also requires pipeline operators to place pipeline markers at frequent intervals along the pipeline rights-of-way, such as where a pipeline intersects a street, highway, railway or waterway, and at other prominent points along the route. Pipeline right-of-way markers can help prevent encroachment and excavation-related damage to pipelines. The Project's pipeline markers (which would identify the owner of the pipe and provide a 24-hour telephone number) would be placed to maximize "line of sight" visibility along the entire pipeline length, except in active agricultural crop locations and in waterbodies in accordance with DOT requirements.

In accordance with DOT regulations, the proposed facilities would be regularly inspected for leakage as part of scheduled operations and maintenance, including:

- physically walking and inspecting the pipeline corridor periodically;
- conducting fly-over inspections of the right-of-way as required;
- inspecting and maintaining MLVs and M&R stations; and
- conducting leak surveys at least once every calendar year or as required by regulations.

During inspections, PennEast employees would look for signs of unusual activity on the right-of-way and would immediately respond to assess the nature of the activity and remedy with prescribed corrective action. In addition, the PennEast Gas Control Center would electronically monitor the operations of the pipeline system and would be staffed 24 hours a day, 365 days a year, and would use a computerized gas-monitoring system to read pressures along the pipeline on a continuous basis. In the event of a leak, the Gas Control Center would have the ability to isolate a segment of pipe by sending commands to close the remotely operated MLVs.

Cathodic protection[25] would be installed along the entire length of the new pipelines to prevent corrosion. PennEast personnel would check the voltage and amperage at regular intervals, as well as the pipe-to-soil potentials and rectifiers.

The DOT regulations specified in Part 192 require that PennEast establish and maintain a liaison with appropriate fire, police, and public officials to learn the resources and responsibilities of each organization that may respond to a natural gas pipeline emergency, and to coordinate mutual assistance. PennEast would utilize the emergency procedures contained in the Project's emergency response plan, which require communication with emergency responders on an annual basis. Local contact phone numbers, external contact information, equipment or resources available for mobilization, and any specific procedures to be followed would be incorporated into the emergency response plans prior to commencement of pipeline operations. PennEast would also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials. Because the pipeline right-of-way is much wider than the pipeline itself, and a pipeline can be anywhere within the right-of-way, state laws require excavators to call their state's One-Call center well in advance of digging in order to locate underground utilities and ensure it is safe for the contractor to dig in that location.

PennEast would establish and maintain liaison with appropriate fire, police, and public officials in a variety of ways. PennEast's annual communications would include the following information:

- the potential hazards associated with Project facilities located in their service area and prevention measures undertaken;
- the types of emergencies that may occur on or near the Project facilities;
- the purpose of pipeline markers and the information contained on them;
- pipeline location information and the availability of the National Pipeline Mapping System;
- recognition of and response to pipeline emergencies; and
- procedures to contact PennEast or its contractors for more information.

PennEast's communications with local emergency responders may involve individual meetings, group meetings, or direct mailings. PennEast would also provide local emergency response and management personnel with emergency response training prior to the Project being placed into service and on an ongoing basis thereafter. Necessary information and instructions regarding the facilities would be provided to local emergency response and management personnel. A plan would be in place for coordination between PennEast and local emergency response and management personnel in the event of an incident. In addition, PennEast would perform periodic emergency exercises and mock emergency drills with local government, law enforcement, and emergency response agencies, subject to agency availability and willingness to participate.

We received scoping comments stating that inspections of the line needed to be conducted on the ground, and not be limited to aerial inspections. PennEast staff would regularly walk the pipeline, conduct leak surveys, and send sensor equipment (i.e., smart pigs) through the line to

[25] Cathodic protection is a technique to reduce corrosion (rust) of the natural gas pipeline that includes the use of an induced current and/or a sacrificial anode that corrodes preferentially.

make sure integrity has not been compromised. PennEast would continuously monitor how much gas is transported through the system, operating pressures and temperatures throughout the system, and other critical operating data. This would be done in real-time through the PennEast Gas Control Center. Should any unusual data surface, PennEast would immediately dispatch field personnel to address the issue and protect the community (as discussed above).

We received scoping comments requesting that the gas be odorized in order to help Project personnel and the public identify leaks. All gas within the pipeline would be odorized with mercaptan to provide an added level of safety and security to the gas system by providing a warning mechanism for the public.

4.11.2 Pipeline Accident Data

The DOT requires all operators of natural gas transmission pipelines to notify the National Response Center at the earliest practicable moment following the discovery of an incident and to submit a report within 30 days to the PHMSA. Incidents are defined as any leaks that:

- caused a death or personal injury requiring hospitalization; or
- involve property damage, including cost of gas lost, of more than $50,000, in 1984 dollars[26]

During the 20-year period from 1995 through 2014, a total of 1,265 significant incidents were reported on the more than 315,000 total miles of natural gas transmission pipelines nationwide (DOT 2015a).

Additional insight into the nature of significant incidents may be found by examining the primary factors that caused the failures. Table 4.11.2-1 provides a distribution of the causal factors, as well as the number of each incident, by cause, from 1995 to 2014. The dominant causes of pipeline incidents from 1995 to 2014 were corrosion and pipeline material, weld, or equipment failure, constituting 45.7 percent of all significant incidents. The pipelines included in the data set in table 4.11.2-1 vary widely in terms of age, diameter, and level of corrosion control. Each variable influences the incident frequency that may be expected for a specific segment of pipeline.

The frequency of significant incidents is strongly dependent on pipeline age. Older pipelines have a higher frequency of corrosion incidents because corrosion is a time-dependent process. Jones et al. (1986) compared reported incidents with the presence or absence of cathodic protection and protective coatings. The results of that study, summarized in table 4.11.2-2, indicated that corrosion control was effective in reducing the incidence of failures caused by external corrosion. The use of both an external protective coating and a cathodic protection system, required on all pipelines installed after July 1971, significantly reduces the corrosion rate compared to unprotected or partially protected pipe. The data also indicate that cathodically protected pipe without a protective coating actually has a higher corrosion rate than unprotected pipe. This anomaly reflects the retrofitting of cathodic protection to actively corroding spots on pipes.

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[26] $50,000 in 1984 dollars is approximately $112,956 in 2015 (U.S. Bureau of Labor Statistics 2015c).

TABLE 4.11.2-1 Natural Gas Transmission Pipeline Significant Incidents by Cause (1995-2014) a/		
Cause	**Number of Incidents**	**Percentage**
Corrosion b/	291	23
Excavation	207	16.4
Pipeline material, weld, or equipment failure	337	26.6
Natural force damage	147	11.6
Outside force c/	79	6.2
Incorrect operation	40	3.2
All other causes d/	164	13.2
Total	**1,265**	**100**

Notes:
a/ All data gathered from PHMSA Significant Incident files, July 15, 2015.
b/ Includes third-party damage.
c/ Fire, explosion, vehicle damage, previous damage, intentional damage.
d/ Miscellaneous causes or other unknown causes.
Source: DOT PHMSA 2015a.

TABLE 4.11.2-2 Incidents Caused by External Corrosion and Level of Protection (1970 through June 1984)	
Corrosion Control	**Incidents per 1,000 Miles per Year**
None – bare pipe	0.42
Cathodic protection only	0.97
Coated only	0.40
Coated and cathodic protection	0.11

Source: Jones et al. 1986

Older pipelines also have a higher frequency of outside force incidents, partly because their location may be less well-known and less well-marked than newer lines. In addition, the older pipelines contain a disproportionate number of smaller diameter pipelines, which are more easily crushed or broken by mechanical equipment or earth movements.

Outside force, excavation, and natural forces were the cause in 34.2 percent of significant pipeline incidents from 1995 to 2014. These result from the encroachment of mechanical equipment such as bulldozers and backhoes; earth movements due to soil settlement, washouts, or geological hazards; weather effects such as winds, storms, and thermal strains; and willful damage. Table 4.11.2-3 provides a breakdown of outside force incidents by cause.

TABLE 4.11.2-3 Outside Forces Incidents by Cause (1995-2014) a/		
Cause	**Number of Incidents**	**Percent of All Incidents**
Third-party excavation damage	172	13.6
Operator excavation damage	24	1.9
Unspecified excavation damage/previous damage	11	0.9
Heavy rain/floods	72	5.7
Earth movement	34	2.7
Lightning/temperature/high winds	26	2.1
Natural force	15	1.2
Vehicle (not engaged with excavation)	47	3.7
Fire/explosion	8	0.6
Previous mechanical damage	6	0.5
Fishing or maritime activity	7	0.5
Intentional damage	1	0.1
Electrical arcing from other equipment/facility	1	0.1
Unspecified/other outside force	7	0.6
Total	**431**	**34.2**

Note:
a/ Excavation, Outside Force, and Natural Force from table 4.11.2-1
Source: DOT PHMSA 2015a.

Since 1982, operators have been required to participate in One-Call public utility programs in populated areas to minimize unauthorized excavation activities in the vicinity of pipelines. The One-Call program is a service used by public utilities and some private sector companies (e.g., oil pipelines and cable television) to provide preconstruction information to contractors or other maintenance workers on the underground location of pipes, cables, and culverts.

4.11.3 Impact on Public Safety

The service incident data summarized in table 4.11.2-1 include pipeline failures of all magnitudes with widely varying consequences. Table 4.11.3-1 presents the average annual fatalities that occurred on natural gas transmission lines between 2010 and 2014. The data has been separated into employees and nonemployees to better identify a fatality rate experienced by the general public. Fatalities among the public averaged two per year over the 20-year period from 1995 to 2014.

The majority of fatalities from natural gas pipelines are associated with local distribution pipelines. These pipelines are not regulated by FERC; they distribute natural gas to homes and businesses after transportation through interstate transmission pipelines. In general, these distribution lines are smaller-diameter pipes and/or plastic pipes that are more susceptible to damage. In addition, local distribution systems do not have large rights-of-way and pipeline markers common to FERC-regulated interstate natural gas transmission pipelines.

TABLE 4.11.3-1 Injuries and Fatalities – Natural Gas Transmission Pipelines				
	Injuries		Fatalities	
Year	Employees	Public	Employees	Public
2010 a/	10	51	2	8
2011	1	0	0	0
2012	3	4	0	0
2013	0	2	0	0
2014	1	0	1	0

Note:
a/ All of the public injuries and fatalities in 2010 were due to the Pacific Gas and Electric pipeline rupture and fire in San Bruno, California on September 9, 2010.
Source: DOT PHMSA 2015b.

The nationwide totals of accidental fatalities from various anthropogenic and natural hazards are listed in table 4.11.3-2 in order to provide a relative measure of the industry-wide safety of natural gas transmission pipelines. Direct comparisons between accident categories should be made cautiously because individual exposures to hazards are not uniform among all categories. As indicated in table 4.11.3-2, the number of fatalities associated with natural gas facilities is much lower than the fatalities from natural hazards such as lightning, tornados, floods, earthquakes, etc.

TABLE 4.11.3-2 Nationwide Accidental Deaths a/	
Type of Accident	Annual No. of Deaths
All accidents	117,809
Motor vehicle	45,343
Poisoning	23,618
Falls	19,656
Injury at Work	5,113
Drowning	3,582
Fire, smoke inhalation, burns	3,197
Floods b/	81
Lightning b/	49
Tornado b/	72
Natural gas distribution lines c/	14
Natural gas transmission pipelines c/	2

Notes:
a/ All data, unless otherwise noted, reflects 2013 statistics from U.S. Department of Health and Human Services, CDC, National Center of Health Statistics, National Vital Statistics System, 2015.
b/ Reflects 2013 statistics from NOAA 2015b.
c/ 20-year average, 1995-2014. DOT PHMSA 2015c, d.

The available data show that natural gas transmission pipelines continue to be a safe and reliable means of energy transportation. From 1995 to 2014, there were an average of 63 significant incidents and two fatalities per year. The number of significant incidents distributed over the more than 315,000 miles of natural gas transmission pipelines indicates that the risk is low for an incident at any given location. Based on this, we conclude that the proposed Project would represent a slight increase in the risk to the public.

4.11.4 Terrorism

Safety and security concerns have changed the way pipeline operators, as well as regulators, must consider terrorism, both in approving new projects and in operating existing facilities. The U.S. Department of Homeland Security is tasked with the mission of coordinating the efforts of all executive departments and agencies to detect, prepare for, prevent, protect against, respond to, and recover from terrorist attacks within the United States. Among its responsibilities, the U.S. Department of Homeland Security oversees the Homeland Infrastructure Threat and Risk Analysis Center, which analyzes and implements the National Critical Infrastructure Prioritization Program that identifies and lists Tier 1 and Tier 2 assets. The Tier 1 and Tier 2 lists are key components of infrastructure protection programs and are used to prioritize infrastructure protection, response, and recovery activities. The Commission, in cooperation with other federal agencies, industry trade groups, and interstate natural gas companies, is working to improve pipeline security practices, strengthen communications within the industry, and extend public outreach in an ongoing effort to secure pipeline infrastructure.

The Commission, like other federal agencies, is faced with a dilemma in how much information can be offered to the public while still providing a significant level of protection to the facility. Consequently, the Commission has taken measures to limit the distribution of information to the public regarding facility design to minimize the risk of sabotage. Facility design and location information has been removed from the FERC's website to ensure that sensitive information filed as Critical Energy Infrastructure Information is not readily available to the public.

The likelihood of future acts of terrorism or sabotage occurring at the Project facilities, or at any of the myriad of natural gas pipeline or energy facilities throughout the United States, is unpredictable given the disparate motives and abilities of terrorist groups. Further, the Commission, in cooperation with other federal agencies, industry trade groups, and interstate natural gas companies, is working to improve pipeline security practices, strengthen communications within the industry, and extend public outreach in an ongoing effort to secure pipeline infrastructure.

In accordance with the DOT surveillance requirements, PennEast would incorporate air and ground inspection of its proposed facilities into its inspection and maintenance program. Security measures at the new aboveground facilities would include secure fencing.

Despite the ongoing potential for terrorist acts along any of the nation's natural gas infrastructure, the continuing need for the construction of these facilities is not eliminated. Given the continued need for natural gas conveyance and the unpredictable nature of terrorist attacks, the efforts of the Commission, the DOT, and the Office of Homeland Security to continually improve pipeline safety would minimize the risk of terrorist sabotage of the Project to the maximum extent practical, while still meeting the nation's natural gas needs. Moreover, the unpredictable possibility of such acts does not support a finding that this particular Project should not be constructed.

4.12 CUMULATIVE IMPACTS

In accordance with NEPA, we considered the cumulative impacts of the Project and other projects or actions in the area. Cumulative impacts represent the incremental effects of the proposed action when added to other past, present, or reasonably foreseeable future projects. Although the individual impact of each separate project may be minor, the additive or synergistic effects of multiple projects could be significant. The direct and indirect impacts of the Project are discussed in other sections of this EIS.

The purpose of this analysis is to identify and describe cumulative impacts that would potentially result from implementation of the PennEast Pipeline Project. This cumulative impacts analysis uses an approach consistent with the methodology set forth in relevant guidance (CEQ, 1997b, 2005; EPA, 1999). Under these guidelines, inclusion of actions within the analysis is based on identifying commonalities of impacts from other actions to potential impacts that would result from the construction and operation of the Project. To avoid unnecessary discussions of insignificant impacts and projects and to adequately address and accomplish the purposes of this analysis, an action must first meet the following three criteria to be included in the cumulative analysis:

- affect a resource potentially affected by the proposed project;
- cause this impact within all, or part of, the geographic project area; and
- cause an impact within all, or part of, the time span for the potential impact from the proposed Project.

We have identified four types of actions that would potentially cause a cumulative impact when considered with the PennEast Pipeline Project. These are:

- other natural gas projects, both under FERC's jurisdiction and those not under FERC's jurisdiction;
- electric generation and transmission projects;
- transportation projects; and
- commercial and large-scale residential developments.

Table 4.12-1 lists other actions (projects) that have been recently constructed, are being constructed presently, or are planned or proposed near the PennEast Pipeline Project facilities.

TABLE 4.12-1

Past, Present, and Reasonably Foreseeable Future Projects Evaluated for Potential Cumulative Impacts with the PennEast Pipeline Project

Other Project	Location (County, State)	Description	Approximate Closest Distance and Direction to Proposed Project	Approximate Permanent Impact Area (acres)	Resources Cumulatively Affected a/	Watershed	Air Quality Control Region	Project Status
Natural Gas Projects								
Auburn Line Extension	Luzerne and Wyoming Counties, PA	A 27.4-mile, 20-inch diameter pipeline and compressor station with a 200,000 Dth/d capacity operated by UGI Energy Services	0.2 mile E	166.1 total, 0.01 PEM wetlands, 0.01 PFO wetlands, 0.01 EV PEM wetlands, 0.01 EV PSS wetlands, 0.08 EV PFO wetlands	GS, GW, SW, WT, VG, WD, T, L, VI, SE, A, N	Upper Susquehanna	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	In service since 2013
Springville Gathering Pipeline	Luzerne, Susquehanna, and Wyoming Counties, PA	A 33.5-mile, 24-inch pipeline operated by Williams that connects Williams' gathering system to the Transco (Williams) pipeline system.	Adjacent	203.0 total	GS, GW, SW, WT, VG, WD, T, L, VI, SE, A, N	Upper Susquehanna	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	In service since 2012
Central New York Oil & Gas Company (CNYOG), LLC MARC II Pipeline	Luzerne, Sullivan, and Wyoming Counties, PA	A 30-mile proposed pipeline that would connect the PennEast pipeline to the MARC I pipeline, a component of the Central New York Oil & Gas Co. LLC pipeline system. This project would also connect the Atlantic Sunrise Pipeline.	Adjacent	3.2 total, 9.91 agriculture, 3.4 forested, 0.25 residential, 9.6 open land, 4.43 PEM wetlands, 0.51 PFO wetlands	GS, GW, SW, WT, VG, WD, T, L, VI, SE, A, N	Bowman Creek, Mehoopany Creek, Upper Susquehanna Middle Susquehanna	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	In the preliminary planning stage
Wyoming Gathering Pipeline	Luzerne and Wyoming Counties, PA	30-mile, 24-inch diameter pipeline delivering 750,000 Dth/d. It is operated by PVR and connects to the Transco pipeline system.	Less than 0.25 mile NW	181.8 total	GS, GW, SW, WT, VG, WD, T, L, VI, SE, A, N	Upper Susquehanna	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	In service since 2012

TABLE 4.12-1

Past, Present, and Reasonably Foreseeable Future Projects Evaluated for Potential Cumulative Impacts with the PennEast Pipeline Project

Other Project	Location (County, State)	Description	Approximate Closest Distance and Direction to Proposed Project	Approximate Permanent Impact Area (acres)	Resources Cumulatively Affected a/	Watershed	Air Quality Control Region	Project Status
Constitution Pipeline Company, LLC Constitution Pipeline (CP13-499-000)	Susquehanna, PA; Broome, Chenango, Delaware, and Schoharie, NY	122 miles of new 30-inch-diameter natural gas pipeline and additional facilities that include two new meter stations, two pipe interconnections, ten communication towers, eleven mainline valves, and one pig launcher and receiver	31 miles N	N/A	A	Upper Susquehanna	Northeast Pennsylvania – Upper Delaware Valley	Start of construction proposed for 2016
Garden State Expansion (FERC Docket No. CP15-89-000)	Burlington County, NJ	This project will include a new compressor station and a meter, and regulating station. It will be owned and operated by Williams.	2.5 miles E	23.2 total, 9.91 agriculture, 3.4 forested, 0.25 residential, 9.6 open land, 4.43 PEM wetlands, 0.51 PFO wetlands	T, A	Millstone	Metropolitan Philadelphia Interstate Air Quality Control Region (PA-NJ Delaware)	Start of construction proposed for early 2016
Franklin Loop (Leidy Southeast Expansion) (FERC Docket No. CP13-551-000)	Tobyhanna and Buck Townships, Luzerne County, PA and Princeton and Montgomery Townships, Mercer County, NJ	This 11.5 mile, 42-inch diameter pipeline will connect to the Transco Pipeline system and will be operated by Williams.	1.5 miles E	69.7 total, 2.0 commercial/ industrial, 0.53 residential, 14.06 open space, 18.04 forested, 3.68 PSS wetlands, 0.16 PFO wetlands	T, A	Lower Lehigh	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	Under Construction

TABLE 4.12-1

Past, Present, and Reasonably Foreseeable Future Projects Evaluated for Potential Cumulative Impacts with the PennEast Pipeline Project

Other Project	Location (County, State)	Description	Approximate Closest Distance and Direction to Proposed Project	Approximate Permanent Impact Area (acres)	Resources Cumulatively Affected a/	Watershed	Air Quality Control Region	Project Status
Skillman Loop (Leidy Southeast Expansion) (FERC Docket No. CP13-551-000)	Princeton and Montgomery Townships, Mercer County, NJ	This 6.3 mile, 42-inch expansion project will connect to the Transco Pipeline system and will be operated by Williams.	5.7 miles NE	37.6 total, 1.12 commercial/ industrial, 1.4 residential, 4.5 open space, 7.3 forested, 0.02 PFO wetlands	A	Millstone	Metropolitan Philadelphia Interstate Air Quality Control Region (PA-NJ Delaware)	Under Construction
Atlantic Sunrise Pipeline (FERC Docket No. CP15-138-000)	Susquehanna, Wayne, Wyoming, Luzerne, Columbia, Northumberland, Schuylkill, Lebanon, Lancaster, Clinton, Lycoming, Lackawanna, PA; Prince William, VA; Howard, MD; NC; SCs	This project, with 190 miles of pipeline, 2.5 miles of pipeline replacement, two new compressor stations, and other facility additions or modifications will expand the Williams' Transco pipeline system.	2.0 miles NW	1108.7 total in PA, 18.1 open land, 14.4 forested, 72.9 agriculture,5.9 PFO wetlands	GW, SW, T, L, A	Bowman Creek, Upper Susquehanna	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region and Northwest Pennsylvania-Youngstown Interstate	Currently proposed. Target in-service date of Summer 2017.
Northeast Supply Enhancement Project	Middlesex, Somerset, NJ; Lancaster, PA;	This pipeline project consists of a 10-mile-long 42-inch-diameter loop in Lancaster County, a 3.4-mile-long 26-inch-diameter loop in Middlesex County, a 22-mile-long, 26-inch-diameter loop of the Lower New York Bay Lateral to the Rockaway Transfer Point off New York State, and modifications to compressor station 200 in Chester County, Pennsylvania. This project would provide 400 MMcf/d of transportation.	10.8 miles NE	N/A	A	Raritan	Metropolitan Philadelphia Interstate Air Quality Control Region (PA-NJ Delaware)	In pre-filing stage

TABLE 4.12-1

Past, Present, and Reasonably Foreseeable Future Projects Evaluated for Potential Cumulative Impacts with the PennEast Pipeline Project

Other Project	Location (County, State)	Description	Approximate Closest Distance and Direction to Proposed Project	Approximate Permanent Impact Area (acres)	Resources Cumulatively Affected a/	Watershed	Air Quality Control Region	Project Status
Northeast Supply Link Project, Stanton Loop (FERC Docket No. CP12-30-000)	Hunterdon, NJ	This project consists of 6.6 miles of 42-inch diameter pipeline loop.	7.0 miles NE	7.23 total, 3.14 open land, 0.65 forested, 0.36 agriculture, 0.21 industrial/ commercial, 0.64 residential, 0.44 PFO wetlands	A	South Branch, Raritan	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	In service since 2013
TGP Uniondale Expansion Project (CP13-526-000)	Susquehanna, PA	Modifications to Compressor Station 321 and Uniondale Meter Station	28 miles N	N/A	A	Upper Susquehanna	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	Operational in service September 2014
Electric Generation and Transmission								
Susquehanna-Roseland Project	Luzerne, Lackawanna, Wayne, Pike, and Monroe Counties, PA	101 miles of 500 kV transmission line operated by PPL Electric Utilities.	Intersects PennEast.	N/A	GS, GW, SW, WT, VG, WD, T, L, VI, SE, A, N	Upper Susquehanna	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	In service since 2015
Northeast Pocono Reliability Project	Lackawanna, Monroe, Wayne, Pike, and Luzerne Counties, PA	This project would create three new electrical substations, 57 miles of new 230 kV transmission lines, and various shorter segments of 69 kV sub-transmission lines and rebuild one 20 mile long kV line.	Adjacent	N/A	GS, GW, SW, WT, VG, WD, T, L, VI, SE, A, N	Upper Lehigh	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	Proposed for completion in fall 2017
Transportation								
Interstate 81	Plains Township, Luzerne County, PA	Replacement of four bridges; two over Jumper Road and two over Sunset Road.	0.1–1.7 miles SW	N/A	GS, GW, SW, WT, VG, WD, T, L, VI, SE, A, N	Upper Susquehanna	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	Under Construction

TABLE 4.12-1

Past, Present, and Reasonably Foreseeable Future Projects Evaluated for Potential Cumulative Impacts with the PennEast Pipeline Project

Other Project	Location (County, State)	Description	Approximate Closest Distance and Direction to Proposed Project	Approximate Permanent Impact Area (acres)	Resources Cumulatively Affected a/	Watershed	Air Quality Control Region	Project Status
US 209 Interchange Road	Franklin and Towamensing Townships, Carbon County, PA	Highway restoration project. Mill and fill 8.43 miles and repair various drainages.	Adjacent	N/A	GS, GW, SW, WT, VG, WD, T, L, VI, SE, A, N	Aquashicola Creek, Pohopoco Creek	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	Estimated project state date of early 2016
Freemansburg Ave Interchange	Bethlehem Township, Northampton County, PA	Roadway reconstruction and bridge rehabilitation of SR 2018 structure.	0.1 mile W	N/A	GS, GW, SW, WT, VG, WD, T, L, VI, SE, A, N	Lower Lehigh	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	Proposed in 2015
NJ Route 31 Expansion	Throughout Raritan Township and Flemington Borough, Hunterdon County, NJ	A parkway system and expanded street networking to Route 31 throughout Raritan Township and Flemington Borough	7.4 miles NE	N/A	A	South Branch Raritan	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	Ongoing
Commercial/Residential Development								
Combined Heat and Power Plant at Blue Mountain	Intersection of PA Turnpike and PA-903, Palmerton, Carbon County, PA	A Combined Heat And Power Plant By Tuthill Corporation, Funded By Pennsylvania Energy Development Authority	4.5 miles SW	N/A	A	Lower Lehigh	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	Not available
Blue Ridge Real Estate Properties	Carbon County, PA	Multiple Resort Residential and Commercial Properties.	0.1 mile E	N/A	GS, GW, SW, WT, VG, WD, T, L, VI, SE, A, N	Upper Lehigh, Middle Lehigh	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	Not available
Sterling Crossing Subdivision	Nazareth Bethlehem Pike in Lower Nazareth Township, Northampton County, PA	A fifty-five lot residential subdivision.	3.2 miles SW	N/A	T, A	Lower Lehigh	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	Not available
Saratoga Farms Subdivision	Nazareth Bethlehem Pike in Lower Nazareth Township, Northampton County, PA	A 55 lot residential subdivision.	0.7 mile W	N/A	GS, GW, SW, WT, VG, WD, T, L, VI, SE, A, N	Lower Lehigh	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	Not available

TABLE 4.12-1

Past, Present, and Reasonably Foreseeable Future Projects Evaluated for Potential Cumulative Impacts with the PennEast Pipeline Project

Other Project	Location (County, State)	Description	Approximate Closest Distance and Direction to Proposed Project	Approximate Permanent Impact Area (acres)	Resources Cumulatively Affected a/	Watershed	Air Quality Control Region	Project Status
Trio Fields Subdivision	Gremar Road in Lower Nazareth Township, Northampton County, PA	A 374 lot residential subdivision.	0.1 mile W	89.8	GS, GW, SW, WT, VG, WD, T, L, VI, SE, A, N	Lower Lehigh	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	Not available
Traditions for America Subdivision	Intersection of Green Pond Road and Farmersville Road in Bethlehem Township, Northampton County, PA	A proposed 265 home subdivision.	0.5 mile W	119	GS, GW, SW, WT, VG, WD, T, L, VI, SE, A, N	Bushkill Creek-Delaware River	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	Not available
Huntington Knolls, LLC Housing Development	West of Route 519 and south of the Fox Hill development in Holland Township, Hunterdon County, NJ	A 29 building age-restricted and assisted-living housing development.	0.1 mile N	87	GS, GW, SW, WT, VG, WD, T, L, VI, SE, A, N	Lower Delaware	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	Not available
Ewing Town Center Redevelopment Project	Parkway Avenue, Ewing Township, Mercer County, NJ	A planned redevelopment of a closed General Motors facility with 1,000 housing units and 115,000 square feet of retail and commercial space.	6 miles SW	128	A	Lower Delaware	Metropolitan Philadelphia Interstate Air Quality Control Region (PA-NJ Delaware)	Not available
St. Luke's University Health Network Expansion Anderson Campus	PA Route 33 intersection with Freemansburg Avenue, Bethlehem Township, Northampton County, PA.	75,000 square foot medical office building with future construction of 1.7 million square feet of additional hospital space, medical offices, and educational and research facilities.	0.1 mile N	40.7	GS, GW, SW, WT, VG, WD, T, L, VI, SE, A, N	Upper Delaware	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	Start of construction proposed for 2016
Subaru Car Dealership on HWY 315	Plains Township, Luzerne County, PA	Landowner is in the process of developing land for a new car dealership.	0.1 mile N	12	GS, GW, SW, WT, VG, WD, T, L, VI, SE, A, N	Upper Susquehanna	Northeast PA-Upper Delaware Valley Interstate Air Quality Control Region	Under construction

TABLE 4.12-1

Past, Present, and Reasonably Foreseeable Future Projects Evaluated for Potential Cumulative Impacts with the PennEast Pipeline Project

Other Project	Location (County, State)	Description	Approximate Closest Distance and Direction to Proposed Project	Approximate Permanent Impact Area (acres)	Resources Cumulatively Affected a/	Watershed	Air Quality Control Region	Project Status
Hopewell Township Affordable Housing Plan	Mercer County, NJ	Proposed affordable housing plans provided by Hopewell Township.	Adjacent	N/A	GS, GW, SW, WT, VG, WD, T, L, VI, SE, A, N	Lower Hudson	Metropolitan Philadelphia Interstate Air Quality Control Region (PA-NJ Delaware)	Not available
WAWA on HWY 31	Mercer County, NJ	Landowner and developer are looking to develop land and are currently working with WAWA to put a store on the property.	Adjacent	N/A	GS, GW, SW, WT, VG, WD, T, L, VI, SE, A, N	Lower Hudson	Metropolitan Philadelphia Interstate Air Quality Control Region (PA-NJ Delaware)	In the preliminary planning stage
Princeton Research Lands Properties	Mercer County, NJ	Princeton Research Lands Inc. - Landowner has plans for residential subdivisions on all 3 properties.	Adjacent	N/A	GS, GW, SW, WT, VG, WD, T, L, VI, SE, A, N	Lower Hudson	Metropolitan Philadelphia Interstate Air Quality Control Region (PA-NJ Delaware)	Not available

Notes:
This table lists the projects that have the most potential to contribute to the cumulative impacts within the vicinity of the proposed PennEast Pipeline Project; it is not intended to provide an all-inclusive listing of projects in the region.

a/ :Dth/d = Dekatherms per day GS = Geology and Soils GW = Groundwater SW = Surface Water WT = Wetlands VG = Vegetation WD = Wildlife and Aquatic T = Traffic L = Land Use and Visual VI = Visual SE = Socioeconomics A = Air N = Noise

The criteria listed below define the Project's region of influence (ROI), which is used in this cumulative impacts analysis to describe the general area for which the Project could contribute to cumulative impacts. The region of influence varies depending on the resource being discussed. Specifically, for the various resources our conservative approach considered that:

- impacts on geology and soils, land use, residential areas, visual resources, air quality, and noise by the Project would be highly localized. Therefore, for cumulative impacts on these resources we evaluated other projects (e.g. residential development, small commercial development, and small transportation projects) within 0.25 mile of the construction work areas for the Project.
- the PennEast Pipeline Project's Kidder Compressor Station would result in long-term impacts on air quality in the 81.55 Northeast Pennsylvania-Upper Delaware Valley Interstate AQCR. Therefore, we evaluated other projects with the potential to result in long-term impacts on air quality (e.g. natural gas compressor stations or industrial facilities) within the same AQCR.
- long-term noise impacts from the PennEast Pipeline Project's Kidder Compressor Station would be localized to within one mile of the site. Therefore, we evaluated other projects that would result in long-term impacts on noise affecting the same NSAs as the PennEast Pipeline Project compressor station.
- waterbody and wetland crossings, as well as impacts on groundwater, vegetation, and wildlife by the Project, would be localized and minimized. Therefore, we included cumulative impacts on these resources by other projects within the sub-watersheds crossed by the PennEast Pipeline Project.

The anticipated cumulative impacts of the Project and these other actions are discussed below. Table 4.12-1 lists past, present, or reasonably foreseeable future projects or activities that may cumulatively or additively affect resources that would be also be affected by the construction and operation of the Project.

4.12.1 Marceullus Shale Development

4.12.1.1 Background

The Marcellus Shale is an approximately 385-million-year-old, organic-rich shale formation that exists beneath 93 million acres of Pennsylvania, southern New York, eastern Ohio, and northern West Virginia. Over geologic time and with the pressure and temperature associated with deep burial, oil and natural gas can be generated within organic-rich shale formations. However, because shale is generally impermeable (that is, fluids do not readily flow through the formation), the oil and natural gas contained in these types of rocks cannot be economically produced using conventional well drilling and completion methods. Within the last 20 years, however, the petroleum industry has developed deep directional drilling techniques in conjunction with hydraulic fracturing (fracking), which has been in use for over 50 years, to recover natural gas from shale reservoirs. Fracking involves the injection of fluids and sand under high pressure to fracture the shale around the wellbore, thus enabling the flow of natural gas to the well.

4.12.1.2 Natural Gas Production

Wells

Recent analysis of Marcellus Shale natural gas extraction in Pennsylvania has shown that development creates "potentially serious patterns of disturbance of on the landscape" (USGS 2012). Construction of access roads, drilling pads, and gathering lines results in land use and cover that affect the ability of ecosystems to provide essential ecological goods and services, resulting in erosion, sedimentation, and habitat fragmentation. Construction of the PennEast Pipeline Project would potentially increase demand for natural gas, which could increase Marcellus Shale natural gas extraction and therefore increase the negative environmental impacts associated with such development. However, there are is currently no current or foreseeable well development or use within ten miles of the project, so Project construction and operation activities would not be expected to result in cumulative impacts within the ROI.

4.12.1.3 Gas Gathering Lines

Pipelines transport the vast majority of natural gas produced and consumed within the United States. Pipeline gathering systems are a system of small scale pipeline infrastructure that allows gas to flow from gathering wells to larger-scale transport or "mid-stream" lines. Construction and operation impacts of pipelines generally scale with the size and length of the project. Gathering lines are generally smaller in size and shorter in length than mid-stream pipelines such as the pipeline proposed by PennEast, so the impacts associated with such developments are expected to be lower.

There are three recently constructed or planned gathering systems within ten miles of the Project. They include:

- UGI Energy Services' Auburn Line Extension, a 27.4-mile, 20 inch diameter pipeline in Wyoming and Luzerne Counties Pennsylvania, constructed in 2013 and placed into service in January 2014;
- Williams' Springville Gathering Pipeline, a 33.5-mile, 24-inch pipeline in Susquehanna, Wyoming, and Luzerne Counties; and
- Energy Transfer Partners' Wyoming Gathering Pipeline, a 30-mile, 24-inch diameter pipeline in Wyoming and Luzerne Counties, Pennsylvania.

All the gathering system projects and facilities within ten miles of the proposed PennEast Pipeline Project are within the Upper Susquehanna Watershed and the Northeast Pennsylvania – Upper Delaware Valley AQCR. Construction of these gathering system facilities would have involved activities similar to construction of interstate natural gas transmission facilities, although land requirements for construction are typically less for gathering systems due to the installation of smaller-diameter pipe.

4.12.2 FERC-Jurisdictional Natural Gas Pipeline Projects

There are seven planned, proposed, or existing FERC-jurisdictional natural gas transmission projects within 10 miles of the Project facilities, six of which involve pipeline construction. A description of each project is below and additional details regarding each project can be obtained through our website at www.ferc.gov by entering the docket number given for each project. At the time of issuance of this EIS, the Marc II Pipeline Project does not have a docket number, because it is still in the company's planning stage and has not entered into the pre-filing process with FERC.

As currently envisioned, CNYOG's MARC II Project would involve constructing a 30-mile, 30-inch-diameter pipeline in Sullivan, Wyoming, and Luzerne counties, Pennsylvania, that would connect CNYOG's existing MARC I pipeline with Transco's Leidy pipeline and the proposed PennEast Pipeline Project.

FERC granted Transco authorization to complete the Garden State Expansion Project, which would expand its interstate natural gas pipeline to provide additional service to New Jersey Natural Gas Company. The project is designed to provide up to 180,000 Dth/d of local gas distribution. The Garden State Expansion project would include the installation of a new compressor station and meter and regulating station in Burlington County, New Jersey. No expansion of the existing Transco pipeline would be required. The project has a target in-service date of November 2016 for Phase 1 and August 2017 for Phase 2. The Garden State Expansion Project would connect to PennEast's proposed delivery point at the Transco Station 205 in Mercer County, New Jersey. The Garden State Expansion project would be located in one of the same watersheds as the proposed PennEast Pipeline Project (Millstone).

The Constitution Pipeline Project includes about 124 miles of new 30-inch-diameter natural gas pipeline in Pennsylvania and New York, two new meter stations, and other facilities. At its closest point in Susquehanna County, the southern terminus of the Constitution Pipeline route is 631 miles from the PennEast Pipeline Project. Most of the pipeline would be constructed using a 100- to 125-foot-wide construction right-of-way, of which 50 feet would typically be retained to operate the facilities.

Transco is proposing the Atlantic Sunrise Project to provide 1,700 MDth/d of capacity from northern Pennsylvania to Alabama. Proposed facilities include construction or replacement of 197.7 miles of various diameter pipe, construction of two new compressor stations and upgrades to three existing compressor stations, and addition M&R stations.

Transco's Leidy Southeast Expansion Project was approved by FERC in December 2014 and placed into service on January 5, 2016. This project involved:

- construction of 29.8 miles of new 42-inch-diameter pipeline loop in four separate segments in Mercer, Somerset, and Hunterdon Counties, New Jersey, and Monroe and Luzerne Counties, Pennsylvania;
- addition of compression and modifying existing Compressor Stations 205, 515, 517, and 520 in Mercer County, New Jersey, and Luzerne, Columbia, and Lycoming Counties, Pennsylvania, respectively;
- modification of existing compressor stations in North Carolina (one facility), Virginia (five facilities), and Maryland (one facility); and
- modification of existing M&R stations, mainline valves, and pig launchers and receivers in North Carolina, Pennsylvania, Virginia, and Maryland.

At its closest points in Luzerne, Lycoming, and Columbia Counties, facilities associated with the Leidy Southeast Expansion Project are 5.7 miles northeast of the PennEast Pipeline Project. The Leidy Southeast Expansion Project was built using a 105-foot-wide construction right-of-way with a 50-foot-wide permanent right-of-way retained for operation, although, due to overlap, most of this comprises existing permanent right-of-way associated with existing Transco pipelines.

Transco is currently operating the Northeast Supply Link project providing an additional 250,000 Dth/d of firm incremental transportation service from various receipt points on Transco's Leidy Line in Pennsylvania to various delivery points along Transco's Mainline and Leidy systems in Pennsylvania, New Jersey, and New York. Facilities include approximately 12 miles of 42-inch diameter pipeline looping extension, 27 miles of pipeline updates, 0.4 mile of pipeline replacement, construction of a new compressor station, and modification of various aboveground facilities. Facilities went into service in late 2013. The Northeast Supply Link project is 7 miles northeast of the proposed PennEast Pipeline Project's MP 84.0.

The TGP Uniondale Expansion Project, located 28 miles north of the PennEast Pipeline Project, consists of modifications to Compressor Station 321 and the Uniondale Meter Station on the Tennessee Gas Pipeline, which is operated by Kinder Morgan.

All identified interstate natural gas pipeline projects are, or would be, within the Northeast Pennsylvania-Upper Delaware Valley Interstate Air Quality Control Region and/or the Metropolitan Philadelphia Interstate Air Quality Control Region (Pennsylvania-New Jersey-Delaware).

4.12.3 Other Actions

Other actions considered in this analysis include electric generation and transmission, transportation, and commercial/residential development projects.

The Susquehanna-Roseland Project, in service since 2015, is a 101 mile 500 kV transmission line operated by PPL Electric Utilities that intersects the PennEast Pipeline route.

The Northeast Pocono Reliability Project, is a project that was completed in April 2016 with land restoration expected to continue for the remainder of 2016. Project facilities include three new electrical substations, 57 miles of new 230 kV transmission lines, and various shorter segments of 69 kV sub-transmission lines and the rebuilding of one 20 mile long electric transmission line.

Transportation projects near the PennEast Pipeline Project with the potential to cumulatively impact environmental resources include:

- replacement of four bridges on Interstate 81 in Plains Township, Pennsylvania, which range in distance from 0.1 to 1.7 miles from the proposed PennEast Pipeline Project route and construction area;
- a highway restoration project on US 209 in Franklin and Towamensing Townships, Pennsylvania, which is adjacent to the PennEast Pipeline Project area;

- a roadway reconstruction and bridge rehabilitation at the Freemansburg Avenue interchange in Bethlehem Township, Pennsylvania, located 0.1 mile from the project; and
- a parkway system and expanded street networking to route 31 throughout Raritan Township and Flemington Borough in New Jersey, located 7.4 miles from the project.

Any resulting impacts from these projects would likely be highly localized, with the most acute being impacts on traffic patterns.

The analysis identified 13 commercial and/or residential development projects located within the ROI. Summaries of these projects are included below. The Pennsylvania Energy Development Authority (PEDA) awarded Blue Mountain a $500,000 grant in 2014 in support of The Tuthill Corporation's project to build a CHP plant, also known as a cogeneration plant, at Blue Mountain. The PennEast Pipeline Project's Blue Mountain Interconnect would feed (and be located adjacent to) this project. The current status and schedule for the cogeneration facility is not available, but the plant would be located in one of the same watersheds as the Project (Lower Lehigh Watershed).

Blue Ridge Real Estate Properties consists of multiple resort residential and commercial properties in Carbon County, Pennsylvania, which the Project would intersect in Kidder Township. The Blue Ridge Real Estate Properties consist of resort residential communities in the Pocono Mountains, including properties such as the Jack Frost National Golf Course. The Blue Ridge Real Estate Properties are located 0.1 mile east of the PennEast Pipeline Project and within two of the same watersheds (Upper Lehigh and Middle Lehigh Watersheds).

Sterling Crossing Subdivision is a proposed 41 lot residential subdivision located approximately 3.2 miles southwest of the proposed MP 64.1. As of May 2016, the project was in the initial sales phase, and the main access road into the property had been laid. The subdivision would be located within the Lower Lehigh Watershed, which the Project would also intersect.

The Saratoga Farms Subdivision is a proposed 55 lot residential subdivision approximately 0.7 mile west of the proposed PennEast Pipeline Project at MP 66.2. Phase I of sales of the project began in the fall of 2015 and, as of May 2016, construction had yet to commence. The subdivision would be within the Lower Lehigh Watershed, which is also intersected by the PennEast Pipeline Project.

Trio Fields Subdivision consists of a proposed 374 lot residential subdivision approximately 0.1 mile southwest of proposed PennEast Pipeline Project at MP 61.8 to MP 64.7. The subdivision, which is currently under construction, consists of 89.8 acres and would be within one of the same watersheds as the proposed PennEast Pipeline Project (Lower Lehigh Watershed).

Traditions of America proposed a subdivision at the current Green Pond Country Club at the intersection of Green Pond Road and Farmersville Road in Bethlehem Township, Northampton County, Pennsylvania. Traditions of America proposes to build a 265 lot subdivision over the span of 119 acres. As of May 2016, the local planning commission had not yet approved the proposal. The proposed subdivision is approximately 0.5 mile west of the PennEast Pipeline Project and located within one of the same watersheds (Bushkill Creek - Delaware River Watershed).

Huntington Knolls, LLC Housing Development is proposed for construction west of Route 519 and south of the Fox Hill Development in Holland Township, Hunterdon County, New Jersey. The proposed project includes building 29 buildings with age-restricted housing units, as well as assisted-living units. The proposed housing development would be located 0.1 mile north of the PennEast Pipeline Project in one of the same watersheds (Lower Delaware River Watershed).

The Ewing Town Center Redevelopment Project, located at Parkway Avenue in Ewing Township, Mercer County, New Jersey, entails the redevelopment of a closed General Motors facility with 1,000 housing units and 115,000 square feet of retail/commercial space. The project would encompass 128 acres and be located six miles southwest of the PennEast Pipeline Project near MP 114. The redevelopment project would be located within one of the same watersheds as the proposed PennEast Pipeline Project (Lower Delaware River Watershed).

The Subaru Car Dealership located on Highway 315 in Plains Township, Luzerne County, Pennsylvania involves the development of 12 acres of land for a new car dealership. As of April 2016, initial site work for the project was complete and foundation work was underway. This project is located less than 0.1 mile north of the PennEast Pipeline Project within one of the same watersheds (Upper Susquehanna River Watershed).

The Hopewell Township Affordable Housing Plan is a proposed affordable housing plan developed by Hopewell Township in an effort to increase the amount of affordable housing in the area. The project would directly overlap the PennEast Pipeline Project and would be located within one of the same watersheds (Lower Delaware River Watershed).

A planned new Wawa convenience store would be located along Highway 31 in Hopewell Township, Mercer County, New Jersey. The landowner and developer are currently in negotiations with Wawa. The project directly overlaps the PennEast Pipeline Project and would be located within one of the same watersheds (Lower Delaware River Watershed).

Princeton Research Lands Inc. intends to build residential subdivisions on three properties in Mercer County, New Jersey. The project directly overlaps the PennEast Pipeline Project and would be located within one of the same watersheds (Lower Delaware River Watershed).

All identified commercial/residential projects are, or would be, within the Northeast Pennsylvania-Upper Delaware Valley Interstate Air Quality Control Region or the Metropolitan Philadelphia Interstate Air Quality Control Region (Pennsylvania-New Jersey-Delaware).

4.12.4 Potential Cumulative Resource Impacts of the Proposed Action

The potential impacts that we consider as part of our cumulative impacts review pertain to:

- geology and soils;
- groundwater, surface water, and wetlands;
- vegetation;
- wildlife;
- fisheries and aquatic resources;
- land use, recreation, special interest areas, and visual resources;
- socioeconomics (including traffic);
- cultural resources; and

- air quality and noise.

In the following analysis we describe the potential cumulative impacts associated with the general development of the above-identified FERC-regulated projects, Marcellus Shale development, nearby non-jurisdictional project-related actions, residential development projects, and transportation projects. For the reasons described above, we did not consider more distant actions in our analysis.

4.12.4.1 Geology and Soils

The PennEast Pipeline Project would be expected to have a direct but temporary impact on near-surface geology and soils. Clearing activities could expose the soil to erosive elements such as precipitation and wind. The pipeline route is predominantly characterized by hills and narrow valleys, with some areas of medium to high relief. Therefore it would be expected that the Project would effect some soils with a relatively high erosion potential. Temporary erosion controls in accordance with FERC's Plan and Procedures would be used to minimize these impacts.

There are no mapped locations of oil and gas wells within 0.25 mile of the Project, and there are no active coal mines within the same area.

The Project's effect on geology and soils would be highly localized and primarily limited to the construction period. Cumulative impacts would only occur if other projects are constructed during the PennEast Pipeline Project's construction period in a shared location. Construction of the Northeast Pocono Reliability Project adjacent to the PennEast Pipeline Project, an electric transmission line, could impacts soils. Compaction due to construction activity could contribute to cumulative erosion impacts on soils. Also, the US 209 Interchange Road and Freemansburg Ave interchange project could also lead soil exposure, compaction, and erosion. Large residential developments like Blue Ridge Real Estate Properties could have similar impacts.

The MARC II Project, which would connect the PennEast pipeline to the MARC I Pipeline, is still in the planning stages. Cumulative impacts on geology and soils in Luzerne County, Pennsylvania could occur if the MARC II and PennEast pipelines were constructed concurrently.

Cumulative impacts on geology and soils would be mitigated through PennEast's use of BMPs during construction and restoration to restore natural grades, control erosion, and implement measures in agricultural areas to minimize long-term impact on soils. Also, PennEast would minimize impacts on soils through implementation of the Erosion and Sediment Control Plan (E&SCP) and the FERC *Plan and Procedures* to avoid topsoil mixing, compaction, and erosion.

Should hazardous materials or contaminated soils and/or sediments be encountered during construction, they would be disposed of at fully licensed and permitted disposal facilities in accordance with applicable state and federal laws and regulations. Consequently, any potential cumulative effects on geological and soil resources via contamination would be minor.

4.12.4.2 Waterbodies, Groundwater, and Wetlands

Cumulative impacts on water quality and use were considered for other projects that impact the same watersheds as those that would be crossed by the Project. Potential impacts on groundwater resources from these projects include changes to water quality, quantity (infiltration), and flow. Surface water impacts from these projects would include short-term impacts during construction, including direct impacts on wetlands and waterbodies for pipeline crossings, in addition to indirect impacts from stormwater runoff. Any projects involving ground disturbance or excavation, including the proposed Project, natural gas development, and transportation projects, could impact groundwater resources. However, projects including the proposed Project would be required to obtain permits for erosion and sediment control, and water use and discharge, and would implement their various SPCC Plans and erosion control plans as mandated by permit requirements. Similarly, impacts on surface waters would also be minimized by other jurisdictional projects' use of FERC's Plan and Procedures or BMPs like those proposed by the Project in order to comply with state regulations for erosion and sediment control. In addition, any net loss of wetlands and waterbodies would be mitigated through the applicable permitting agency.

The Project would cross areas with naturally elevated arsenic concentrations in bedrock. Pipeline construction activities can cause inadvertent arsenic release through blasting and exposure of arsenic containing rock to aerobic ground water, resulting in leaching. See section 4.1.5.5 for details. There is a possibility that the proposed Project, together with others such as the recently completed Northeast Supply Link Project's Stanton Loop, could result in additional arsenic exposure to groundwater in the Hunterdon County area.

4.12.4.3 Vegetation, Wildlife and Habitat, and Aquatic Resources

The PennEast Pipeline Project would cross agricultural areas, forest/woodland areas, open land, wetlands, residential areas, and industrial/commercial areas. Cumulative impacts on vegetation and wildlife in conjunction with other projects would be expected. Most would be temporary, but there would be permanent impacts. Right-of-way clearing and grading associated with the Project and other projects would result in the removal of vegetation, alteration of wildlife habitat, displacement of wildlife, and other potential secondary effects; such as increased population stress, predation, and the establishment or spread of invasive plant species. These effects would be greatest where the other projects are constructed within the same timeframe and areas as the proposed Project. However, even construction that does not overlap temporally can have cumulative effects, as it takes time for vegetation/habitat to return to a preconstruction state.

Edge effects, which would be permanent due to permanent vegetation removal for some projects, and the necessity of maintaining the rights-of-way of utility projects clear of forest vegetation, would result in permanent cumulative impacts on habitat. A number of nearby linear projects, with pipelines such as the Atlantic Sunrise Pipeline, the Leidy Southside Expansion, the MARC II Pipeline, and the Susquehanna-Roseland Project, could contribute to these cumulative impacts. This would reduce habitat available to species that prefer deep forests, while increasing habitat for species that prefer open areas and edge habitat. White tailed deer flourish in edge environments and can serve as vectors for tick-borne diseases such as Lyme disease.

Right-of-ways can result in the spread of invasive species, because these species often flourish in areas where vegetation has been disturbed. Other linear projects that are adjacent or cross the PennEast Pipeline Project route could potentially lead to a greater spread of invasive vegetation. PennEast would develop a Project specific invasive plant management plan in coordination with the appropriate regulatory agencies to minimize the Project's contribution to the cumulative impact of all the linear projects in the area.

Fisheries could be temporarily impacted by stream crossings throughout the Project. PennEast plans to minimize these impacts by following their E&SCP. No long-term impacts on fisheries would be expected after restoration of stream bottoms, banks, and regrowth of riparian vegetation. Restoration activities would take place after construction is complete. Routine operation and management activities are not expected to impact fisheries resources.

4.12.4.4 Land Use, Recreation, Special Interest Areas, and Visual Resources

The PennEast Pipeline Project would result in temporary and permanent changes in land use. In areas crossed by the pipeline, vegetation within the permanent operational right-of-way would be maintained in an herbaceous state, however existing land uses would be allowed to continue. Land uses within new permanent aboveground facilities would be permanently converted to natural gas facilities. Similar land use impacts would occur for other buried pipeline projects in the area such as the Atlantic Sunrise Pipeline, the Leidy Southside Expansion, and the MARC II Pipeline, and other projects with new permanent aboveground facilities would contribute to cumulative change in land use.

The visual character of the existing landscape is defined by historic and current land uses. The visual qualities of the landscape are further influenced by existing linear installations such as highways, railroads, pipelines, mining operations, and electrical transmission and distribution lines. Temporary visual impacts would be evident during Project construction due to clearing, grading, and construction activities. Infrastructure associated with the proposed Project and other nearby pipeline projects would be buried, with the exceptions being aboveground facilities such as the Kidder Compressor Station, launcher/receiver sites, interconnects, and lateral tap sites. Most disturbed areas associated with these projects would be revegetated after construction, thereby limiting permanent visual impacts on forested areas where the new permanent right-of-way would be maintained as required for pipeline safety and operational requirements. The visual impact of this Project would be minimal and has been designed to further reduce impacts on visual resources.

The Project would cross the Appalachian National Scenic Trail in Carbon County, Pennsylvania, at a location where there is not an existing linear utility or disturbance. The proposed crossing would add to the cumulative impact of other linear projects that currently cross the trail or are planned to cross the trail, such as the Atlantic Sunrise Project. Each project that crosses the Appalachian National Scenic Trail is evaluated as needed such that design for construction and operation would be done to avoid or minimize short and long term impacts on visual quality and trail users.

4.12.4.5 Socioeconomics

With other projects in the area taken into account, the cumulative socioeconomic impact would be an increase in temporary employment opportunities during construction of the various projects. However, most of these impacts will be short term. Construction of the proposed Project in combination with others could potentially negatively impact tourism and the recreation industry, however these impacts would be expected to be temporary and isolated, primarily related to construction disturbance in isolated locations. The combined tax revenue from the various Projects would be expected to have a positive cumulative impact on the economies of Pennsylvania and New Jersey.

Temporary Housing

Temporary housing would be required for construction workers not drawn from the local area. While multiple projects being constructed at the same time could potentially cause a temporary lodging shortage, based on temporary lodging available in the Project area Luzerne County is the only area where this may be a concern. If there was a shortage of temporary lodging for any periods during construction of the various projects, workers and others seeing temporary lodging would need to search beyond the immediate communities for temporary housing.

Public Services

The cumulative impact of the PennEast Pipeline Project and the other projects considered in this analysis on infrastructure and public services would depend on the number of projects under construction at one time. The small incremental demands of several projects occurring at the same time could become difficult for police, fire, and emergency service personnel to address. PennEast plans to mitigate these potential impacts by providing local emergency response and management teams with emergency training. Also, local response teams would be provided with necessary information and instructions regarding the proposed facilities.

Traffic

Construction of the proposed Project would have a temporary impact on road traffic in some areas and could contribute to cumulative traffic, parking, and transit impacts if other projects are scheduled to be constructed at the same time and in the same area as the PennEast Pipeline Project. The addition of traffic on local roadways associated with construction personnel commuting to and from the Project construction work areas could also contribute to cumulative regional traffic congestion. However, any contribution by the PennEast Pipeline Project to cumulative traffic impacts are expected to be temporary and short term. If construction on other projects occurs concurrently, the cumulative impact on traffic patterns could lead to congestion in localized areas. Transportation projects such as bridge construction could result in a cumulative impact on traffic patterns surrounding the construction zone, but such impacts would depend on timing and location of each project's construction.

4.12.4.6 Cultural Resources

Cumulative impacts on cultural resources would be localized and restricted to the immediate construction work areas. It is unlikely that the proposed Project and other projects could cumulatively affect any cultural resources, because these resources are very localized and are only affected if they are directly in the construction or staging zones of the projects. Projects evaluated in our analysis that are defined as federal actions would be required to include cultural resources inventory and mitigation measures as needed designed to avoid or minimize direct impacts on cultural resources. Where direct impacts on cultural resources are unavoidable, mitigation (e.g. recovery and curation of materials) would occur before construction. Non-federal actions would need to comply with any requirements imposed by respective state reviews and permitting. While any construction activity incrementally adds to the cumulative impacts on cultural resources, this increase would not be significant.

Indian tribes in the Project area have expressed concern about the cumulative impact on properties of traditional religious or cultural significance that may be affected by the various undertakings. For the PennEast Pipeline Project, PennEast and FERC staff have consulted with the tribes who have a potential interest in the Project area Other agencies (e.g., USACE) also conduct tribal consultation for projects under their jurisdiction in order to identify and address any tribal concerns.

4.12.4.7 Air Quality and Noise

Construction of most of the projects and activities listed in table 4.12-1 would involve the temporary use of heavy equipment, vehicles, and other equipment powered by diesel or gasoline engines that would generate emissions of air contaminants. Construction activities would also result in the temporary generation of fugitive dust due to land clearing, ground excavation, and cut and fill operations, as well as noise. Construction of the PennEast Pipeline Project would contribute cumulatively to air quality impacts. The combined impact of multiple construction projects occurring in the same airshed and timeframe as the PennEast Pipeline Project could temporarily add to the ongoing air impacts in the Project area. The construction equipment emissions would result in short-term fugitive emissions that would be highly localized, temporary, and intermittent. Construction of many of the projects listed in table 4.12-1 would not occur at the same time as construction of the PennEast Pipeline Project facilities or are located sufficiently far away as to not result in cumulative air impacts.

Some components of the Proposed and other projects listed in table 4.12-1 would have long-term air and noise impacts during operation. Estimated emissions from the proposed Kidder Compressor Station are below all PSD thresholds except for GHG, and the requirements of PSD are not triggered if GHG is the only pollutant above the PSD threshold. Estimated emissions for the interconnect stations and fugitive pipeline emission sources are below PSD thresholds for all pollutants. Therefore, the proposed Kidder Compressor Station and interconnect stations are considered non-major sources of emissions, and do not exceed NAAQS, and would not be expected to contribute significantly to cumulative impacts on air quality.

Long-term cumulative noise impacts from the PennEast Pipeline Project in conjunction with other projects is not expected, as operational noise impacts would be very localized, and estimate operational noise impacts are within FERC regulatory limits. Cumulative noise impacts are possible during construction, especially in areas requiring blasting and HDD operations for pipeline installation. The Marc II Pipeline Project, the Northeast Pocono Reliability Project, and the Franklin Loop Project (Leidy Southeast Expansion) could potentially be under construction at the same time and could result in cumulative noise impacts, but due to the size of these projects and the localized nature of noise impacts it is unlikely that construction would result in any significant cumulative effects. Any impacts would be short term.

4.12.4.8 Climate Change

Climate change is the change in climate over time, whether due to natural variability or as a result of human activity, and cannot be represented by single annual events or individual anomalies. For example, a single large flood event or particularly hot summer are not indications of climate change, while a series of floods or warm years that statistically change the average precipitation or temperature over years or decades may indicate climate change.

The Intergovernmental Panel on Climate Change (IPCC) is the leading international, multi-governmental scientific body for the assessment of climate change. The United States is a member of the IPCC and participates in the IPCC working groups to develop reports. The leading U.S.

scientific body on climate change is the U.S. Global Change Research Program (USGCRP). Thirteen federal departments and agencies[27] participate in the USGCRP, which began as a presidential initiative in 1989 and was mandated by Congress in the Global Change Research Act of 1990.

The IPCC and USGCRP have recognized that:

- globally, GHGs have been accumulating in the atmosphere since the beginning of the industrial era (circa 1750);
- combustion of fossil fuels (coal, petroleum, and natural gas), combined with agriculture and clearing of forests is primarily responsible for this accumulation of GHG;
- these anthropogenic GHG emissions are the primary contributing factor to climate change; and
- impacts extend beyond atmospheric climate change alone, and include changes to water resources, transportation, agriculture, ecosystems, and human health.

The White House CEQ has issued revised draft guidance regarding the evaluation of GHG emissions and climate change impacts as part of NEPA analyses (CEQ 2014). The CEQ acknowledges in its guidance that "climate impacts are not attributable to any single action," and therefore recommends that NEPA analyses use the "projected GHG emissions and also, when appropriate, potential changes in carbon sequestration and storage, as the proxy for assessing a proposed action's potential climate change impacts" (CEQ 2014). CEQ also recommends that the following aspects be considered as part of the GHG and climate change evaluation, to the extent that is commensurate with the quantity of projected GHG emissions:

- differential GHG emissions from alternatives to the proposed action;
- the potential for mitigation of GHG impacts, including the use of, for example, carbon capture and sequestration (CCS), lower GHG emitting technology, and energy efficiency; and
- the potential for effects of climate change to worsen other environmental impacts of an action, or possibly to shorten the projected life of a project.

Potential GHG emissions from construction and operation of the Project have been estimated in accordance with CEQ guidance. Construction GHG emissions are shown in table 4.12.4-1 and operational phase GHG emissions are shown in table 4.12.4-2. Potential GHG emissions from decommissioning would be similar to those from construction, and would be generated by fuel combustion in the various types of engines and equipment used for decommissioning of the Project components.

[27] The following departments comprise the U.S. Global Change Research Program: EPA, DOE, U.S. Department of Commerce, U.S. Department of Defense, U.S. Department of Agriculture, U.S. Department of Interior, U.S. Department of State, Pipeline and Hazardous Materials Safety Administration, Department of Health and Human Services, National Aeronautics and Space Administration, National Science Foundation, Smithsonian Institution, and Agency for International Development.

TABLE 4.12.4-1 Project Facility and Pipeline Construction Activity Combined GHG Emissions		
Source Category		**Emissions (Total Tons) CO2e**
Pipeline Diesel Non-Road Equipment Totals		31,476
Diesel and Gas On-Road		1,690
Construction Activity Fugitive Dust		-
Roadway Fugitive Dust		-
Comp. Station Construction Sub-Total		1,712
	Total	**34,878**

TABLE 4.12.4-2 Operational Phase GHG Emissions		
Source Category		**Emissions (Tons Per Year) CO2e**
Compressor Station		191,785
PA Pipeline Total		11,450
NJ Pipeline Total		70,823
	Total	**274,057**

We have received comments from EPA recommending that we also estimate GHG emissions from the development and production of natural gas being transported through the proposed pipeline, as well as estimate the GHG emissions associated with the end use of the gas. FERC has in the past ruled that while upstream development and production of natural gas might be a "reasonably foreseeable" effect of a proposed action, the actual scope and extent of potential GHG emissions from upstream natural gas production is not reasonably foreseeable (FERC 2015). CEQ's draft guidance on evaluating GHG impacts does not require NEPA analyses to include such unforeseeable effects.

However, GHG impacts from end use of the gas transported by the Project are reasonably foreseeable. The proposed transmission capacity of the Project is 1.1 million dekatherms per day (MMDth/d). A dekatherm is equal to 10 therms, or 1,000,000 Btus, of heat content. Using the GHG emission factors and global warming potentials published in 40 CFR 98 for emissions of CO_2, CH_4, and N_2O from combustion of natural gas, potential end-use GHG emissions would be 23,500,000 tons per year during the expected lifetime of the Project.

In May 2014, the USGCRP issued a report, Climate Change Impacts in the United States: The Third National Climate Assessment, summarizing the impacts that climate change has already had on the United States and what projected impacts climate change may have in the future (USGCRP 2014). The report includes a breakdown of overall impacts by resource and impacts described for various regions of the United States. Although climate change is a global concern, for this cumulative analysis we focus on the potential cumulative impacts of climate change in the PennEast Pipeline Project area.

The USGCRP report, also simply referred to as the National Climate Assessment (NCA) makes the following projections for potential climate change in the Northeast region of the United States during the expected Project lifetime:

- the frequency, intensity and duration of heat waves is expected to increase. The average number of days exceeding 90 °F currently ranges between 0-5 and 10-20 days per year in the Project area, and could increase in range to between 5-10 and 30-40 days per year during the 2041-2070 time period.
- changes in precipitation patterns are expected. During the expected Project lifetime, the NCA projects small increases in average winter precipitation, an increased frequency of heavy downpours, and an increased risk of summer drought due to earlier spring snowmelt.
- increased cold damage to crops is projected, due to a higher frequency of premature spring warm spells followed by hard freezes.
- increased crop damage and reduced crop yields are projected due to intense precipitation events, delays in crop plantings and harvest, and heat stress.
- increased stress on native vegetation is projected due to the spread of invasive insects and growth of invasive weeds such as kudzu.
- the species distributions of trees and plants are projected to move to higher elevations.
- bird ranges are projected to move northward, and migratory birds are projected to arrive earlier in the spring.
- increases are projected in carrier habitat and human exposure to vector-borne diseases such as Lyme disease, West Nile virus, and Zika virus.

These projected climate change effects in the Project area are not anticipated to exacerbate any other environmental impacts from the Project during its expected lifetime.

4.12.4.9 Reliability and Safety

Impacts on reliability and public safety would be mitigated through the use of the DOT Minimum Federal Safety Standards in 49 CFR 192, which are intended to protect the public and prevent natural gas facility accidents and failures. Additionally, PennEast's construction contractors would be required to comply with the Occupational Safety and Health Administration Safety and Health Regulations for Construction in 29 CFR 1926. The DOT's minimum safety standards for operating and maintaining pipeline facilities include a requirement to establish a written plan governing these activities. Key elements of PennEast's emergency procedures are described in detail in section 4.11.1 of this EIS.

There is a cumulative reliability and safety risk when pipelines are located close to each other. Based on the construction and design methods of pipelines collocated within a shared right-of-way, it is unlikely that one pipeline failure would cause the adjacent pipeline to also fail. As previously described, the Project would be designed and constructed in accordance with or in exceedance of the DOT's Minimum Federal Safety Standards and to meet requirements established for protection of metallic facilities from external, internal, and atmospheric corrosion.

4.12.5 Conclusion

Recently completed, ongoing, and planned projects in the Project area were identified for inclusion in this cumulative impact analysis (refer to table 4.12-1). The majority of cumulative impacts would be temporary and minor when considered in combination with past, present, and reasonably foreseeable activities. However, some long-term cumulative impacts would occur on wetland and forested and upland vegetation and associated wildlife habitats. Some long-term cumulative benefits to the communities would be realized from the increased tax revenues. Short-term cumulative benefits would also be realized through construction jobs and wages and purchases of goods and materials. Emissions associated with the Project would contribute to cumulative air quality impacts. There is also the potential, however, that the Project would contribute to a cumulative improvement in regional air quality if a portion of the natural gas associated with the PennEast Pipeline Project displaces the use of other more polluting fossil fuels. In summary, due to the implementation of specialized construction techniques, the relatively short construction timeframe in any one location, and carefully developed resource protection and mitigation plans designed to minimize and control environmental impacts for the PennEast Pipeline Project as a whole, minimal cumulative effects are anticipated when the impacts of the PennEast Pipeline Project are added to those of the other identified projects in the immediate area.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF THE FERC STAFF ENVIRONMENTAL ANALYSIS

The conclusions and recommendations presented in this section are those of FERC environmental staff and were developed with input from the U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and U.S. Department of Agriculture Natural Resources Conservation Service, as cooperating agencies. The federal cooperating agencies may adopt the EIS per 40 CFR 1506.13 if, after an independent review of the document, they conclude that their permitting requirements and/or regulatory responsibilities have been satisfied. However, these agencies would present their own conclusions and recommendations in their respective and applicable records of decision or determinations. Otherwise, they may elect to conduct their own supplemental environmental analysis, if necessary.

We determined that construction and operation of the PennEast Project would result in some adverse environmental impacts. Most of these impacts would be temporary or short-term during construction and operation, but long-term and potentially permanent environmental impacts on vegetation, wetlands, and individual fish and wildlife species would also occur as part of the Project. However, if the Project is constructed and operated in accordance with applicable laws and regulations, the mitigating measures discussed in this EIS, and our recommendations, most of the adverse impacts would be reduced to less than significant levels. This determination is based on a review of the information provided by PennEast, and further developed from data requests; site reviews; scoping; literature research; alternatives analysis; and contacts with federal, state, and local agencies as well as Native American tribes. As part of our review, we developed specific mitigation measures that we determined would appropriately and reasonably reduce the environmental impacts resulting from construction and operation of the Project. Therefore, we are recommending that our mitigation measures be attached as conditions to any authorization issued by the Commission. A summary of the anticipated impacts from the Project and our conclusions regarding impacts are provided below by resource area.

5.1.1 Geological Resources

The Project would be located within four physiographic provinces: the Appalachian Plateaus Province, Ridge and Valley Province, New England Province, and the Piedmont Province. Bedrock geology of the Project area is dominated by sedimentary rocks with limited amounts of metamorphic and igneous rock. PennEast anticipates that some rock removal would be required in the Project area. Blasting activity would be performed according to federal and state safety standards and in accordance with PennEast's comprehensive Blasting Plan to be implemented by a certified blasting contractor.

Mineral resources in the Project area include crushed stone, cement, tripoli, lime, and sand and gravel production. There are 27 abandoned or reclaimed mines along the route, all located within Luzerne County. We are recommending that PennEast provide the results of its ongoing evaluation of potential presence of working and abandoned mines near the proposed crossing of the Susquehanna River. There are two active quarries within 0.25 mile of the Project area and two active industrial mineral quarries about 4 miles from the Project, all located in Luzerne County. PennEast has contacted the quarry owners and aligned the pipeline to avoid future expansion plans of these quarries. There are no mines or quarries located within 0.25 mile of the Project in New

Jersey. Trap Rock Industries operates three crushed stone quarries in Lambertville, Titusville, and Pennington, all within 2.5 miles from the Project. PennEast has been in contact with Trap Rock Industries regarding future quarry expansion plans and is confident that the Project is located at a safe distance from these expansion plans. Based on the distance and operation of these quarries, there should be no impact during construction and operation of the pipeline. There are no mapped locations of oil and gas wells within 0.25 mile of the Project.

Seismic hazards with potential to affect the pipeline include earthquakes, surface faults, and soil liquefaction. The pipeline would be designed in accordance with all applicable federal and state safety codes, which would govern pipeline thickness, welding standards for joints, and pipeline strength. The greatest seismic risk to the Project is near the Ramapo Seismic Zone; however, based on USGS information, seismic hazard is low. We conclude that this would allow the pipeline to withstand nearly all ground shaking that could be anticipated to occur from an earthquake, with the possible exception of ground movement associated with a fault rupture.

The Project would be located in an area considered to have a low incidence of landslides for the New Jersey portion of the Project. However, in Pennsylvania, portions of the Project are susceptible to landslides. Site-specific evaluations of landslide risks are ongoing by Hatch Mott MacDonald. In Phase 1 of its Terrain Mapping and Geohazard Risk Evaluation Report PennEast identified the areas listed above as areas where it would conduct further field investigation and analysis. We are recommending that PennEast include in its pipeline design geotechnical report an evaluation of liquefaction hazards along the pipeline route and at the compressor station site as well as necessary mitigation measures. We are also recommending that PennEast include in its pipeline design geotechnical report the results of ongoing evaluations necessary to support final pipeline routing/mitigation measures through geologically hazardous areas, a final landslide inventory, specific landslide mitigation measures with locations, and a post-construction landslide monitoring plan.

PennEast would implement mitigation measures to control waterbody flow increases during pipeline installation activities in accordance with PennEast's E&SCP. No permanent aboveground facilities are located within 100-year floodplains as reported by the Federal Emergency Management Agency. Aboveground facilities located near floodplains and pipeline stream crossings would be designed to prevent potential impacts from high-velocity flows, largely by controlling erosion, in accordance with PennEast's E&SCP.

The portions of the Project with potential karst impacts include sections of the Project in Carbon, Northampton, and Bucks counties in Pennsylvania and Hunterdon County in New Jersey, totaling about 13.8 miles. PennEast continues to complete additional geophysical investigations as landowner permissions become available, and would incorporate this work into a final Karst Mitigation Plan. As discussed above, we recommend that PennEast include in its pipeline design geotechnical report the results of additional geophysical surveys and a final Karst Mitigation Plan.

Naturally occurring arsenic is present in trace amounts in the rocks for the Newark Basin of southeastern Pennsylvania and New Jersey. In order to evaluate concerns that commenters expressed related to the potential arsenic mobilization of naturally occurring arsenic in Hunterdon and Mercer Counties, New Jersey, PennEast initiated a study that resulted in a comprehensive, independent leachability evaluation of representative rock samples collected along the proposed pipeline route from both the surface and geotechnical borings. Based on the results of this study, we believe that no mitigation measures related to arsenic mobilization are necessary during Project construction and operation. However, PennEast has prepared a well testing plan and proposes to conduct groundwater quality testing of potentially affected wells prior to construction that would provide a baseline to determine whether any arsenic increases in groundwater occur after the pipeline is installed and operational. We are recommending that PennEast conduct post-construction testing of potentially affected wells to identify whether arsenic and/or uranium concentrations have increased above safe drinking water levels. In the unlikely event that the construction Project causes a significant impact on a water-supply well, PennEast would provide a treatment system to remove arsenic from the drinking water at individual properties or find an alternative water source.

PennEast is conducting geotechnical investigations at 11 proposed HDD crossings. The purpose of the geotechnical investigations was to understand if the existing condition would be suitable to use the HDD method and to help design each HDD crossing. PennEast has developed a HDD Drilling Plan for Karst Terrain, to be included as part of the Karst Mitigation Plan, as several of the crossings would be performed in carbonate rock.

With the implementation of PennEast's proposed mitigation measures and our recommendations, the geologic risk to Project facilities would be minimized. Hence, we conclude that the Project would not have significant impacts on geological resources.

5.1.2 Soils

The Project would cross numerous soil types. Pipeline construction activities, such as clearing, grading, trench excavation, backfilling, and the movement of construction equipment, along the right-of-way may affect soil resources.

Areas with shallow depth to bedrock pose a risk of introducing rock into the topsoil in agricultural and residential areas. Minimization efforts would include topsoil segregation and protection along the trench, rock backfill in residential and agricultural areas only to the top of the existing bedrock profile, and disposal of excess rock fragments in an approved manner so as to not incorporate rock fragments into topsoil layers. If bedrock is encountered, PennEast would take precautions to minimize the mixing of excavated bedrock with backfill and would replace rock in the trench to a level that is not higher than the original bedrock profile. If blasting is required, the minimum explosive charge necessary would be used to fracture bedrock and minimize shot-rock from leaving the construction right-of-way.

PennEast would minimize soil compaction and rutting, erosion, impacts on prime farmland and drainage tiles and increase revegetation potential by following its E&SCP and FERC's Plan and Procedures. At the end of construction, PennEast would return surface contours and drainage patterns to as close to original conditions as practicable and reestablish vegetation as soon as possible following final grading. PennEast would inspect the right-of-way and maintain erosion and sediment controls as necessary until final stabilization is achieved. Once revegetation is satisfactory, temporary erosion control measures would be removed.

If contaminated soils or groundwater are encountered during construction, PennEast would follow protocol in its Unexpected Contamination Encounter Procedures. This plan includes procedures to test for contaminants if suspect soils are encountered as well as management and disposal of contaminated soils at a licensed disposal facility.

Implementation of PennEast's E&SCP, FERC's Plan and Procedures and other project-specific plans would adequately avoid, minimize, or mitigate construction impacts on soil resources. Permanent impacts on soils would mainly occur at the aboveground facilities where the sites would be converted to industrial use. Based on our analysis, we conclude that potential impacts on soils would be avoided or effectively minimized or mitigated.

5.1.3 Water Resources

5.1.3.1 Groundwater

Groundwater resources in the Project area include four principal aquifer systems as well as a number of surficial unconsolidated aquifers in Pennsylvania and New Jersey. In addition, the Project would cross two EPA-designated sole source aquifers. The Project would cross three wellhead protection areas, the Riegelsville Borough Zone III WHPA in Pennsylvania (Zone III) and two WHPAs in Milford Borough and Alexandria Township, New Jersey (Tier I; Tier III).

There are no public and/or private water supply wells or springs that would be located within 150 feet of the pipeline construction workspace in Pennsylvania. Two public supply wells were identified within the boundaries of Alexandria Township in Hunterdon County, New Jersey. These wells were in proximity to MP 84.7 and were within 90 and 149 feet of the proposed workspace. Because surveys along the Project route are not yet complete, we are recommending that, prior to construction, PennEast provide a revised list of water wells and springs within 150 feet of any construction workspace based on completed surveys. PennEast has prepared a Well Monitoring Plan to outline procedures for pre- and post-construction monitoring of all identified drinking water supply wells, including private, community, municipal/public wells, and springs, within 150 feet of the proposed construction workspace. PennEast would perform pre- and post-construction monitoring for water quality and yield for private and public wells within 150 feet of the proposed construction workspace. In the event that any water supply's quantity or quality is affected during construction, PennEast would provide an alternate water supply source or pay damages to the landowner for a new, analogous well. PennEast would file a report with the Secretary within 30 days of completion of construction detailing landowner complaints received regarding well quality and yield, and how these complaints were addressed and/or resolved.

PennEast has identified five groundwater seeps within or near the proposed workspace in Pennsylvania. Because surveys along the Project route are not yet complete, we are recommending that, prior to construction, PennEast provide a revised list of groundwater seeps and springs within or near the proposed workspace based on completed surveys.

In areas where blasting or rock hammering may be needed to excavate the trench to proper depth, fracturing of the bedrock may result in shallow groundwater infiltration in these areas. Blast charges would be limited to that needed to fracture rock to the required trench depth, and fracturing of bedrock would therefore be limited to within several feet of the pipeline trench. All blasting would be performed in a manner consistent with the guidance in PennEast's Project-specific Blasting Plan. The Revised Karst Mitigation increases evaluation from 150 feet to 500 feet for wells and springs within areas of karst terrain. The Well Monitoring Plan includes separate sections for karst terrain well and spring monitoring. The Revised Karst Monitoring Plan also includes a discussion on the use of BMPs in karst terrain during construction for the protection of groundwater resources. Any unanticipated contaminated soils encountered during construction of the facilities for the Project would be managed in accordance with applicable federal and state regulations and the standard operating procedures in the Unanticipated Discovery of Contamination Plan.

PennEast would implement several measures to minimize and mitigate impacts on groundwater including special blasting techniques, installation of trench breakers, use of special dewatering methods, and a ban on refueling or storing hazardous materials within a 200-foot radius of private wells, and a 400-foot radius of community and municipal wells without an approved variance.

Based on our analysis, we conclude that the Project is not expected to significantly impact groundwater quality or quantity during construction or operation. PennEast would implement its E&SCP to minimize erosion potential of soils in the right-of-way, minimize the mobilization of soils on steep slopes via storm water runoff and minimize sedimentation in local waterbodies crossed by the right-of-way.

5.1.3.2 Surface Waters

Surface water resources crossed by the Project would include rivers, streams, associated tributaries, lakes, wetlands, and stormwater catchment basins. The pipeline would cross three major basins including the Upper Susquehanna, the Upper Delaware, and the Lower Hudson basins. The Project would cross 255 waterbodies (159 perennial, 45 intermittent, and 40 ephemeral, and 11 open water), 11 of which are classified as major. PennEast proposes to cross waterbodies using a combination of HDD, bores, and dry-crossing methods. Beltzville Lake, the Lehigh River (at two locations), the Delaware River, Lockatong Creek (at two locations), and Woolsey Brook UNT would be crossed using the HDD method. Because additional geotechnical investigations are planned at these crossings to further characterize the geology and because PennEast has not indicated what mitigation measures would be implemented to minimize drilling risks, we are recommending that PennEast provide all outstanding geotechnical feasibility studies for HDD crossing locations and identify the mitigation measures to be implemented to minimize drilling risks. In the event that any of the HDD crossings fail, we are recommending that PennEast provide final site-specific contingency crossing plans concurrent with its USACE application for an open-cut crossing.

PennEast is proposing to use both surface water and municipal water sources for hydrostatic testing. In total, PennEast anticipates withdrawing about 18 million gallons of water for hydrostatic testing. Because PennEast has not identified the final hydrostatic test water withdrawal locations, we are recommending that PennEast provide documentation of the final hydrostatic test water withdrawal sources and locations, and provide documentation that all necessary permits and approval have been obtained for withdrawal from each source. Also, PennEast should provide a plan detailing the decision process for determining when an alternative water source would be used during exceptional dry periods when low flow conditions may be encountered. We are also recommending that PennEast identify any biocides it would use and measures to neutralize the effects prior to the discharge of test water. Accidental spills during construction and operations would be prevented or adequately minimized with the implementation of PennEast's SPCC Plan.

Based on the avoidance and minimization measures developed by PennEast, including its E&SCP as well as our recommendations, we conclude that the Project would not have adverse impacts on surface water resources.

5.1.3.3 Aquatic Resources

Construction of the pipeline could have both direct and indirect impacts on aquatic biological resources. In-stream pipeline construction could remove habitat, temporarily increase sedimentation and turbidity in the water column, increase the potential for streambank erosion, temporarily disturb streambed foraging areas, and temporarily increase the potential for fuel or chemical spills. To minimize the extent and duration of these potential impacts, PennEast would implement the requirements and BMPs found in its E&SCP and FERC's Plan and Procedures.

The Project has the potential to restrict the flow of water as well as the movement of aquatic organisms within the waterbody during both construction and operation of the Project if the crossing is not constructed correctly. The conventional bore and HDD crossing method would involve installing the main pipeline segment beneath the waterbody which would avoid disturbance of the banks and bottom substrate and avoid altering the flow of water within the waterbody. The open-cut method would use flumes or dam-and-pumps to move water around the open trench, thereby temporarily altering the flow of water and likely restricting fish passage during the 24 to 48 hours it would take to install the pipeline across the waterbody. To ensure that the flow of water and movement of fish is not impacted on a long-term basis at the proposed crossings, the depth of the pipe through waterbodies would be determined by the USDOT minimize safety requirements (to prevent the pipe from becoming perched within the waterbody), and culverts and/or bridges used at the proposed access road crossings would be installed in compliance with all state and federal requirements.

PennEast would comply with all waterbody crossing windows established by state and federal permits in order to avoid or minimize impacts on aquatic biological resources. In accordance with the FERC Procedures, all in-stream work would be performed between June 1 and September 30 to protect CWF and between June 1 and November 30 to protect warm water fisheries, unless other more stringent agency timing restrictions would apply to the affected waterbody as a result of permit conditions.

With the implementation of these measures, as well as measures in FERC's Plan and Procedures, we conclude that overall impacts on aquatic resources would be minimized.

5.1.4 Wetlands

Construction of the Project would temporarily impact about 56 acres of wetlands (26 acres in Pennsylvania and 30 acres in New Jersey) and permanently impact about 35 acres of wetlands (17 acres in Pennsylvania and 18 acres in New Jersey). About 26 acres of forested or scrub-shrub wetlands would be converted to scrub-shrub or emergent types due to clearing of wetlands within the operational right-of-way. In emergent wetlands, the impact of construction would be relatively brief because the herbaceous vegetation would regenerate quickly, typically within one to three years. In scrub-shrub wetlands, PennEast would maintain a 10-foot-wide corridor centered over the pipeline in an herbaceous state and would selectively cut trees within a 30-foot-wide corridor centered over the pipeline. The remainder of forested and scrub-shrub vegetation would be allowed to return to preconstruction conditions and would not be affected during operation. The wetland impacts are based on preliminary desktop analyses for many of the New Jersey wetlands crossed by the Project and are pending final field delineation. However, there would be no permanent wetland loss from construction of the Project, as wetland disturbances would only include temporary disturbances or modifications to other types: from forested/scrub-shrub to scrub-shrub/emergent types. PennEast would provide wetland delineations and acres of wetland impacts after field delineations have been completed.

Construction activities at wetland crossings would be performed in accordance with applicable regulatory requirements, PennEast's E&SCP, and FERC's Plan and Procedures. PennEast is currently developing Project-specific mitigation measures in consultation with the USACE and state agencies. It is anticipated that mitigation would be achieved through a combination of on-site restoration and off-site mitigation. For temporarily disturbed wetlands, restoration and revegetation would be performed in place, in kind with the appropriate wetland plantings. For permanent wetland modifications, PennEast would comply with agency approved compensatory wetland mitigation and restoration plans that would be developed during the wetland permitting processes in consultation with USACE and applicable state agency requirements. PennEast would conduct routine wetland monitoring of wetlands affected by construction until revegetation is successful and would implement mitigation measures to control the invasive species in accordance with its Invasive Species Management Plan.

Vernal pools are considered to be communities of special concern in both Pennsylvania and New Jersey and the Project would impact several vernal pool areas within the proposed pipeline right-of-way. Based on current information, approximately 0.13 acre of vernal pool habitats would be impacted by construction of the Project, with 0.11 acre permanently impacted during operation. Should additional potential vernal habitats be discovered after full property access has been obtained, a time of year restriction would be observed if vernal habitats cannot be avoided. This time of year restriction would be observed during the key breeding period (i.e., March through June) for obligate and facultative amphibian species. All disturbed areas would be restored to pre-construction conditions following pipeline installation.

Based on the proposed mitigation measures, and our recommendations, we conclude that impacts on wetland resources, including vernal pools, would be effectively minimized or mitigated.

5.1.5 Vegetation and Wildlife

The Project area currently supports a wide diversity of wildlife species, including those adapted to natural forested and open habitat types, as well as disturbed types such as residential, industrial, and agricultural areas. Forested areas would be the most common habitat type affected by the Project (consisting of approximately 38 percent of the Project's impacts), followed by agricultural areas, residential/industrial/commercial areas, open lands, and open water habitats.

The impact of Project construction and operation on terrestrial wildlife species and their habitats would vary depending on the timing of construction, types of construction techniques used, the habitat and life-history requirements of each species affected, and the type and extent of habitats that would be impacted. Direct impacts on wildlife during construction could include the displacement of wildlife from the Project area, as well as direct mortality of some individuals. Some species are likely to be displaced from habitats that are cleared of vegetation as well as from areas adjacent to construction sites due to construction noise and visual disturbances. These impacts may negatively affect population growth through diminished rates of survivorship and fecundity.

Stakeholders have identified several vegetative communities of special concern that could potentially occur along the Project. These include ephemeral/fluctuating natural pools and herbaceous vernal ponds (i.e., vernal pools), leatherleaf – cranberry bogs, pitch pine – rhodora – scrub oak woodlands, and red spruce palustrine woodlands. Of these vegetative communities of special concern, only the vernal pool habitats have been identified within the Project area to-date (see section 5.1.4); however, surveys have not been completed for the entire Project, and it is possible that additional areas that support vegetative communities of special concern may exist within the unsurveyed areas.

Long-term habitat impacts could result from a permanent shift in vegetation structure, primarily where trees would be prevented from occupying the permanent pipeline right-of-way during operation of the Project. Where preconstruction conditions were similar (e.g., where the permanent right-of-way crossed through an area that was originally an open or agricultural habitat), the effects of the permanent right-of-way on these habitat would be minimal. However, where the construction impacts change species composition or habitat structure to a substantial degree (e.g., in previously forested habitats), wildlife that are closely associated with the original conditions of the area may respond by shifting activity to habitats that provide better support (e.g., forest dependent species may no-longer use these modified habitats).

Impacts on forest habitat could include fragmentation and edge effects. To minimize the fragmentation of large contiguous stands of forest and the associated edge effects, the proposed pipeline route was sited to avoid areas containing large, interior forested stands where possible. When forests could not be avoided, proposed routing through a forest was accomplished by locating the pipeline as far from the interior portion of the forest as practicable to maximize preservation of interior forest habitat. Approximately 26.8 miles of the pipeline route in Pennsylvania and 16.8 miles of the pipeline route in New Jersey would be located adjacent to existing rights-of-way for this purpose, which totals to approximately 37 percent of the Project's length in both states.

Construction of the Project would have an impact on vegetation. Construction areas would be cleared of vegetation in order to provide a safe working area. The limits of clearing would be identified and flagged in the field prior to the start of clearing activities, and PennEast would install erosion control measures following the initial disturbance of the soil as described in its E&SCP. Following construction, all temporarily disturbed areas would be restored in accordance with our Plan and Procedures. PennEast would monitor revegetated areas to ensure the post-construction revegetation is successful. Impacts are expected to be "short-term" in non-forested areas that are allowed to restore to preconstruction conditions, as it is expected that these non-forested areas would be successfully restored within three years following construction (with implementation of PennEast's E&SCP and FERC's Plan and Procedures). However, all impacts on forested habitats would be considered long-term because of the time required to restore woody vegetation to preconstruction conditions.

During operation, routine maintenance of the right-of-way would occur to allow continued access for routine pipeline patrols, and to maintain access in the event of emergency repairs as well as to maintain visibility during aerial patrols. In upland areas, maintenance of the right-of-way would involve clearing the entire permanent right-of-way of woody vegetation (e.g., the maintained permanent rights-of-way would be mowed every three years to clear woody vegetation). In addition, to facilitate periodic corrosion surveys, a 10-foot-wide strip centered on the pipeline would be mowed annually to maintain herbaceous growth.

The Project would cross through and impact areas that have been identified as regions that contain unique or exemplary wildlife habitats. This includes the Bear Creek Preserve, Sourland Mountain Region, State Game Lands, Deer Management Areas, and Important Bird Areas (including Hickory Run State Park, Kittatinny Ridge, Musconetcong Gorge, Everittstown Grassland, Baldpate Mountain, and Pole Farm). We received comments expressing concern about the Project's impacts on the Green Pond Marsh IBA in Pennsylvania; however, the Green Pond Marsh IBA would not be crossed or affected by the Project. At one time, the Project would have impacted the Milford Bluffs area (i.e., an areas that contains steep shale cliffs and woodlands along the edge of the Delaware River); however, the proposed route has been altered to avoid this area.

PennEast would work with the appropriate regulatory agencies (e.g. PADEP, NJDEP, PADCNR) as part of the permitting process to minimize the potential that invasive or noxious plant species to spread during construction of the Project. PennEast would also implement its Invasive Plant Species Control Plan during construction and operation of the Project in order to minimize the risk of invasive plants spreading within the Project rights-of-way and to control existing invasive populations that might prevent successful revegetation of the area.

PennEast would implement restrictions on the locations and timing of construction activities, as required by state and federal agencies, in order to avoid or minimize impacts on wildlife species and their habitats. Furthermore, PennEast would be required to develop a Migratory Bird Conservation Plan and implement measures recommended by the FWS to protect bald eagles in order to comply with the MBTA and BGEPA. In addition, PennEast would work with the local soil conservation district as well as land management agencies to determine the appropriate seed mixes that should be used during revegetation efforts. With the implementation of these measures, as well as the requirements found in FERC's Plan and Procedures, we conclude that overall impacts on terrestrial resources would be adequately minimized.

5.1.6 Threatened, Endangered, and Special Status Species

The species included in the Threatened, Endangered, and Special Status Species section of this EIS include those species that are federally listed under the ESA, those that are listed under applicable state endangered species laws (e.g., the Pennsylvania Endangered Species Coordination Act and the New Jersey Endangered Species Conservation Act), and those that are considered Species of Special Concern in New Jersey.

Through informal consultation with the FWS and NMFS, five federally listed threatened or endangered species have been identified as potentially occurring in the Project area. These species include two mammals (Indiana bat and northern long-eared bat), one reptile (bog turtle), one invertebrate (dwarf wedgemussel), and one plant species (northeastern bulrush). The PFBC further identified two fish species that are listed under both the ESA and the two applicable state endangered species laws (the Atlantic sturgeon and Shortnose sturgeon) as potentially occurring downstream of the Project area; although the NMFS stated that these two listed fish species do not occur in the Project area and would not be impacted by the Project. Due to this comment by the PFBC, analysis of these two listed fish species was included in this EIS.

PennEast has attempted to avoid habitats and known occurrences of ESA listed species, and has committed to avoidance and minimization measures related to these species, including 1) timing restrictions on tree clearing in areas identified by the FWS as important to listed bat species; 2) implementation of a 300-foot no disturbance buffer around wetlands and 150-foot no disturbance buffer around waterways that support listed species; 3) use of a HDD crossing method for waterbodies suspected of supporting listed species; and 4) the implementation of surveys for listed species in all suitable habitats crossed by the Project. Furthermore, consultation with the FWS is ongoing regarding ESA listed species, and as part of this ongoing consultation process the FWS may develop additional measures beyond those described in this EIS to avoid or minimize impacts on ESA listed species. The implementation of these measures would likely avoid or minimize some of the potential impacts that could occur on ESA listed species; however, all areas of potential suitable habitats have not been surveyed to date (indicating that additional occurrences of these species is possible along the Project). Therefore, our preliminary threat determination for the Indiana bat, northern long-eared bat, bog turtle, dwarf wedgemussel, and northeastern bulrush is that the Project "*may affect and is likely to adversely affect*" these species. Our preliminary threat determination for the Atlantic sturgeon and Shortnose sturgeon is "*no effect*", as these species occur approximately 20 river-miles downstream of the Project and the implementation of the Project's design features (e.g., the proposed HDD crossing of the Delaware River, as well as the requirements found in PennEast's E&SCP and FERC's Plan and Procedures) would prevent any Project related effects from occurring in waters 20 miles downstream (i.e., in areas where this species is found). We are further recommending that PennEast complete all surveys of potential suitable habitats for special status species in the Project area, and not construct any portion of the Project until formal consultation with the FWS is complete.

The Project has the potential to impact multiple state listed species, as well as New Jersey Species of Special Concern. PennEast has stated that it would adhere to the recommendations and requirements of the respective state agencies with jurisdiction over state listed species and state species of concern in order to avoid or minimize impacts on these species. PennEast has also indicated that ongoing permit review by Pennsylvania and New Jersey may result in the identification of additional avoidance, minimization, or mitigation measures that would be included as part of the Project's permit conditions. In general, we believe that relying on state-level experts for the development of measures that would minimize impacts on state listed species and state species of concern would appropriately avoid or reduce impact on these species. However, all mitigation measures would need to be consistent with, and not contradictory to, any measures required by our review and attached to the Commission's authorization to the Project if so authorized. As a result, we are recommending that PennEast continue to work with the state agencies on measures to avoid or minimize impacts on these state species.

5.1.7 Land Use, Recreation, and Visual Resources

Construction of the Project would impact a total of about 1,613.5 acres. About 66 percent of this acreage would be utilized for the pipeline facilities, including the construction right-of-way and ATWS. The remaining acreage affected during construction would be associated with aboveground facilities (4 percent), pipe and contractor ware yards (23 percent), and access roads (7 percent). Construction in Pennsylvania would affect a total of 1,182 acres; of this about

534 acres would be retained as permanent right-of-way for operation of the pipeline and the aboveground facilities. In New Jersey, about 431 acres would be affected by construction, and approximately 250 acres would be retained for permanent operation of facilities. Land uses impacted by the PennEast Pipeline Project would include forest, agriculture, open land, residential, industrial/commercial, and some open water. About 37 percent of the pipeline would be co-located with existing rights-of-way.

The proposed route would cross or be co-located with underground pipelines or electrical wires owned and operated by the following companies: Buckeye Partners, Columbia Gas Transmission, Elizabethtown Gas Co, Metropolitan Edison Company, JCP&L, PECO Energy, Pennsylvania Power and Light, Texas Eastern Transmission, Transcontinental Gas Pipe Line, UGI, and Williams Field Services. PennEast has negotiated placement of the pipeline within the existing JCP&L easement but is still working with the other utilities to finalize location of the pipeline within or adjacent to the existing rights-of-way, to further minimize impacts on existing land use.

The maintained right-of-way would be mowed no more than once every three years, but a 10-foot-wide strip centered over the pipeline might be mowed annually to facilitate corrosion and other operational surveys. The construction of permanent structures or the planting of trees, would be prohibited within the permanent right-of-way. To facilitate pipeline inspection, operation, and maintenance, the entire permanent right-of-way in upland areas would be maintained in an herbaceous/scrub-shrub vegetated state.

Based on field surveys conducted by PennEast where access was available, and review of aerial photography in other locations, PennEast's proposed construction work areas would be located within 50 feet of 462 structures (i.e., houses and apartment buildings, commercial or industrial facilities, sheds, garages), with 298 structures within 25 feet of PennEast's proposed construction work area. A total of 66 of these structures within 25 feet of PennEast's proposed construction work area are residential structures. PennEast has prepared site-specific construction plans for some of the residences within 50 feet of the construction right-of-way and ATWS. PennEast would reduce or offset the construction right-of-way for short distances to avoid houses and minimize impacts. We are recommending that PennEast provide site-specific construction plans for all residences within 50 feet of the construction right-of-way and ATWS including landowner approval.

Thirteen planned residential and commercial development projects have been identified within 0.25 mile of the proposed Project facilities, including seven residential developments, three commercial developments, two municipal developments, and one hospital expansion. We are recommending that PennEast continue to consult with landowners for several of these planned developments regarding the status of the Project and file with the Secretary any mitigation measures PennEast would implement to minimize impacts on the developments prior to the end of the draft EIS comment period.

PennEast would require about 104 acres of agricultural land in Pennsylvania and 100 acres in New Jersey as new permanent right-of-way, but operation of the proposed pipeline would not affect the continuing use of these areas for agricultural activities after construction is complete. Temporary impacts on agricultural land during Project construction could occur from removal of vegetation, disturbance of soils, and increased dust from exposed soils. Agricultural land in the Project area does not include any specialty crops, sugar maple stands, areas used for timber production, or commercial tree farms. Following construction, all affected agricultural land would be restored to preconstruction conditions to the extent possible, in accordance with PennEast's E&SCP and Agricultural Impact Minimization Plan, and with any specific requirements identified by landowners or state or federal agencies with appropriate jurisdiction.

In general, the effects of the Project on recreational and special interest areas occurring outside of forestland would be temporary and limited to the period of active construction, which typically lasts several weeks or months in any one area. These effects would be minimized by implementing the measures in PennEast's E&SCP, BMPs, and other project-specific construction plans. In addition, PennEast would continue to consult with the owners and managing agencies of recreation and special interest areas regarding the need for specific construction mitigation measures. PennEast considered several alternative crossing locations of the Appalachian National Scenic Trail, and has developed a site-specific crossing plan at this location, after considering comments and perspectives shared by NPS, ATC, PGC, and other stakeholders for the crossing of the Appalachian National Scenic Trail. We have reviewed this crossing plan and find it acceptable. However, PennEast is responsible for obtaining the pertinent permits from the appropriate authorities for crossing the Appalachian National Scenic Trail at this location. To further minimize effects on other recreation and special interest areas crossed by the Project, we are recommending that PennEast file an update on the status of development of the site-specific crossing plans for each of the recreation and special interest areas listed as being crossed or otherwise affected in appendix G-14, including site-specific timing restrictions, proposed closure details and notifications, specific safety measures, and other mitigation to be implemented.

The Project would cross a number of areas enrolled in a variety of conservation programs. Although there would be temporary impacts and potential disruption during construction, following pipeline installation all activities and accesses currently available to the public would be returned to their original state. We are recommending that PennEast file the results of consultations with the NRCS and landowner of the one known USDA easement crossed, any proposed mitigation measures to be implemented, and copies of correspondence prior to the end of the draft EIS comment period. The limited permanent easement area that PennEast would acquire for pipeline installation and operation would lose its conservation status, but only in that PennEast would acquire the development rights to install and maintain the pipeline in this easement. The majority of the land area that is subject to conservation easement restriction would retain its conservation restriction status outside of PennEast's permanent right-of-way, following construction.

The Project would not cross any known landfills or hazardous waste sites, although portions of the Project, between MPs 47 and 52 would occur within a 1-mile buffer zone from the Palmerton Zinc Pile Superfund site. The pipeline would not impact existing and/or on-going Superfund site remedies, and that levels of contamination, if existing outside of the Superfund site boundary, would have been within an acceptable risk threshold and remedial action would not be required.

Visual resources along the proposed pipeline route are a function of geology, climate, and historical processes, and include topographic relief, vegetation, water, wildlife, land use, and human uses and development. A portion of the new pipeline (about 37 percent) would be installed adjacent to existing rights-of-way. As a result, the visual resources along this portion of the Project have been previously affected by other similar activities. Impacts in other areas would be greatest where the pipeline route would parallel or cross roads and the pipeline right-of-way may be seen by passing motorists; from residences where vegetation used for visual screening or for ornamental value is removed; and where the pipeline is routed through forested areas.

After construction, all disturbed areas, including forested areas, would be restored in compliance with PennEast's E&SCP and Plan; federal, state, and local permits; landowner agreements; and easement requirements. Generally this would include seeding the restored areas with grasses and other herbaceous vegetation, after which trees would be allowed to regenerate within the temporary workspaces. The visual effects of construction on forested areas would be permanent on the maintained right-of-way where the regrowth of trees would not be allowed, and would be long term, lasting several years or longer, in the temporary workspaces. The greatest potential visual effect would result from the removal of large specimen trees, but the visual effects of removing smaller trees would even last for several years. PennEast would reseed with native plants to revegetate the construction right-of-way.

The compressor station would be located in previously logged, disturbed forest in Carbon County, Pennsylvania. Visual disturbance would be limited to vegetation clearance for the access road off Pennsylvania Route 940 and partial views of the site from Interstate 80. FERC finds that the retention of trees and shrubs around the perimeter of the compressor station site would provide sufficient cover to avoid any significant adverse visual impacts.

With implementation of PennEast's proposed impact avoidance, minimization, and mitigation plans, and our recommendations, we conclude that overall impacts on land use and visual resources would be adequately minimized.

5.1.8 Socioeconomics

The Project would create economic benefits for local communities by generating additional tax revenue, employment opportunities, and local expenditures by workers. Construction of the Project would require about 2,400 workers, with a maximum of 600 people working on any one spread at any one time. PennEast estimates that up to 40 percent of the workforce would consist of local hires and 60 percent nonlocal hires. As pipeline construction would be distributed along six counties in two states, the Project is not expected to have a significant impact on the local population or housing in any of the counties. Operation of the Project would require 24 new permanent employees to would operate the new pipeline and compressor station.

PennEast estimates that property tax would generate an estimated $11.1 million in one-time income tax payments to the Commonwealth of Pennsylvania, and $6.4 million in payments to the State of New Jersey during construction. Operation of the Project would support approximately $154,000 each year in income tax payments to the Commonwealth of Pennsylvania, and $25,000 in payments to the State of New Jersey. These taxes would be assessed at the county level and are based on the percentage of total pipeline mileage in a given county.

Temporary impacts on traffic during construction would result from the workforce commuting daily to the construction site. The number of construction vehicle trips would be low on any particular roadway at any one time because staging areas and construction spreads would be distributed along the pipeline route and construction would move sequentially along the construction right-of-way. To maintain safe conditions and minimize impacts on roads, construction workers would use only designated public roads and approved access roads on private lands for access to the right-of-way and compressor stations. PennEast has indicated that it would develop a Traffic Management Plan prior to the final EIS that would include mitigation measures designed to minimize traffic-related impacts.

The Project would cross a total of 53 census block groups in six counties and two states. A review of demographic and economic data identified one census block group that could be considered a potential minority population and two other census block groups that could be considered potential low income populations. Construction and operation of the Project is not expected to have high and adverse human health or environmental effects on any nearby communities or result in adverse and disproportionate human health or environmental effects to minority or low income communities. We conclude that potential adverse impacts of the Project would not unduly or disproportionately affect environmental justice populations.

5.1.9 Cultural Resources

A sizeable portion of the Project has not been investigated for cultural resources. Where PennEast had been granted survey access it has conducted cultural resources identification surveys on approximately 3,110 acres in Pennsylvania and 587 acres in New Jersey. PennEast has recommended avoiding a number of the identified resources and proposes to conduct additional resource evaluations, where necessary. Although the Pennsylvania and New Jersey SHPOs concurred with some of the recommendations, they did not agree with all of the recommendations by PennEast. Consultation is ongoing with the Pennsylvania and New Jersey SHPOs. We are recommending that PennEast provide documentation of Pennsylvania and New Jersey SHPOs' concurrence with PennEast's proposed avoidance, resource identification/recommendations, updated documentation, avoidance plans, and evaluation reports/treatment plans, when necessary. If NRHP-eligible archaeological sites cannot be protected from Project impacts, a treatment plan or mitigation of adverse effects may be developed and included within an Agreement document.

NPS expressed concerns regarding potential Project effects to trails and cultural resources. PennEast has ongoing consultation with the NPS and the Commonwealth of Pennsylvania.

Additionally, we are recommending that PennEast develop a vibration monitoring plan and modify its blasting plan to include a review of potential effects to cultural resources.

To ensure that our responsibilities under section 106 of the NHPA are met, we are recommending that PennEast not begin construction until additional required surveys are completed, survey reports and treatment plans (if necessary) have been reviewed by the consulting parties, and we provide written notification to proceed. The studies and impact avoidance, minimization, and measures proposed by PennEast, and our recommendation, would ensure that any adverse effects on cultural resources would be appropriately mitigated.

5.1.10 Air Quality and Noise

5.1.10.1 Air Quality

Construction of the Project components would result in short-term increases in emissions of some air pollutants due to the use of equipment powered by diesel fuel or gasoline engines and the generation of fugitive dust due to the disturbance of soil and other dust-generating activities. Such air quality impacts would generally be temporary and localized, and are not expected to cause or contribute to a violation of applicable air quality standards. Local emissions may be elevated, and nearby residents may notice elevated levels of fugitive dust, but these would not be significant. Pipeline construction is anticipated to occur in four separate spreads, each of which is estimated to result in 6.5 months of emission-generating activities, while construction activities at the Kidder Compressor Station would take 6 months. Preparation of access roads and pipeyards would generate emissions for an estimated 3 months, including laying of gravel, and then removal of gravel at the end of construction. Construction staging areas would produce emissions for an estimated 10 months.

During operation of the pipeline and the Kidder Compressor Station, emissions of criteria pollutants, GHGs, and HAPs would occur. Estimated emissions from the proposed Kidder Compressor Station are below all PSD thresholds except for GHG. However, the requirements of PSD are not triggered if GHG is the only pollutant above the PSD threshold. Along the pipeline route, leaks and venting could occur at compressor stations and potentially from small leaks at flanges and valves. Emissions expected during operation of the pipeline would be relatively minor. No Federal Class I Areas would be impacted.

PennEast would be required to meet all federal and state air quality permitting requirements prior to construction and operation of the Project. PennEast would comply with federal and state air quality permitting rules, including the installation of mitigation measures and technologies required to meet federal and state air quality regulations. Therefore, we conclude that the Project would not result in significant air quality impacts.

5.1.10.2 Noise

Potential noise impacts associated with compressor station and pipeline construction were assessed based on construction phase. Because the construction of the compressor station would exceed FERC's threshold at several NSAs, PennEast may evaluate and implement mitigation measures as necessary such as use of temporary noise barriers. For NSAs that are closer to pipeline-related construction activity, such as the Econolodge, Pizza Residence, and Golf Course, mitigation may be needed depending on the construction activity. Depending on listener proximity to the Project right-of-way experiencing activity, pipeline construction noise may also be audible to recreationists enjoying Hickory Run State Park and the eastern end of Beltzville State Park. During construction, PennEast would employ a combination of noise mitigation methods, including equipment noise controls, temporary noise barriers, and administrative measures including temporary relocation of residents, to minimize noise related to construction activity at NSAs near the Project. These would include appropriate mitigation measures to achieve compliance during HDD installation operations and equipping haul trucks and other engine-powered equipment with adequate mufflers. PennEast would restrict timing of noisy construction or demolition work to 7 a.m. to 10 p.m. We are recommending that PennEast file a noise mitigation plan prior to construction and implement this plan during HDD or direct pipe construction activities.

The Project would likely require blasting in some areas of the proposed route to dislodge bedrock resulting in potential noise and vibration impacts. PennEast's Blasting Plan includes mitigation measures related to blasting activity. Blasting would be conducted in accordance with applicable agency regulations, including advance public notification and mitigation measures as necessary.

The primary source of operational noise for the Project would be the Kidder Compressor Station. PennEast would be required to meet the most restrictive noise level limits established by jurisdictional agencies. The FERC limit of 55 dBA Ldn, which is equivalent to a continuous noise level of 49 dBA, would be the governing limit for those areas where a more restrictive county, local, or station-specific regulation does not exist. PennEast would implement mitigation measures to ensure that the applicable standards are met at the nearest NSA, including installing the turbines in acoustically insulated and treated buildings and, if possible, locating the inlet silencer inside the compressor building. We are recommending that PennEast conduct noise surveys after completing the compressor station construction to confirm that noise standards are met.

If blow-off valves are to be used during planned maintenance, PennEast would affix a silencer to the blow-off valve to minimize noise impacts. Maintenance blowdown events would typically occur only during daytime hours and PennEast plans to notify all landowners in the immediate area. Due to the infrequency and short duration of the blowdown events, noise impacts are expected to be minimal.

Based on the analyses conducted, the proposed mitigation measures, and our recommendations, we concluded that construction and operation of the Project would not result in significant noise impacts on residents and the surrounding environment.

5.1.11 Reliability and Safety

The pipeline and aboveground facilities associated with the Project would be designed, constructed, operated, and maintained to meet the DOT Minimum Federal Safety Standards in 49 CFR 192 and other applicable federal and state regulations. These regulations include specifications for material selection and qualification; minimum design requirements; and protection of the pipeline from internal, external, and atmospheric corrosion. Several commenters expressed concern about how the pipeline would be maintained over time and the long-term safety of operations. The DOT rules require regular inspection and maintenance, including repairs as necessary, to ensure the pipeline has adequate strength to transport the natural gas safely. Further, although regulations requiring remote control shut-off valves have not yet gone into effect and would apply to pipelines built in the future, PennEast committed to the use of remote control shut-off valves for the proposed pipelines.

We received several comments about the potential effects of a pipeline rupture and natural gas ignition (the area of potential effect is sometimes referred to as the potential impact radius), including potential effects on vulnerable populations (e.g., children, the elderly, or the infirm). While a pipeline rupture does not necessarily ignite, the DOT does publish rules that define HCAs where a gas pipeline accident could do considerable harm to people and their property and requires an integrity management program to minimize the potential for an accident. PennEast routed the pipeline to minimize risks to local residents and vulnerable locations/populations (e.g., hospitals, prisons, schools, daycare facilities, retirement or assisted-living facilities) and would follow federal safety standards for pipeline class locations based on population density. Because the proposed route has changed in several locations, we are recommending that PennEast provide a revised table of class locations based on these route changes. The DOT regulations are designed to ensure adequate safety measures are implemented to protect all populations.

We received comments from residents who were concerned about constructing new structures or residences within an HCA and if there are any construction guidelines. There are no restrictions for building within an HCA; the area would be assessed during pipeline inspections and could be reclassified based on the type of structures built. Setback restrictions for new buildings and structures would be based on the terms of the pipeline easement. Some residents were concerned about collocated pipelines on their property increasing the potential impact radius. Based on the construction and design methods of pipelines collocated within a shared right-of-way, it is unlikely that one pipeline failure would cause the adjacent pipeline to also fail.

We conclude that PennEast's implementation of the above measures would ensure compliance with the DOT's regulations regarding public safety and the integrity of the proposed facilities.

5.1.12 Cumulative Effects

Three types of projects (past, present, and reasonably foreseeable projects) could potentially contribute to a cumulative impact when considered with the Project. These projects include Marcellus Shale development (wells and gathering systems); FERC-jurisdictional natural gas pipelines; other natural gas facilities that are not under the Commission's jurisdiction; and other actions including electric transmission and generation projects, transportation projects, and residential and commercial developments. The region of influence for cumulative impacts varied depending on the resource being discussed. Specifically, we included:

- minor actions, such as residential development, small commercial development, and small transportation projects within 0.5 mile of the Project;
- major actions, such as large commercial, industrial, transportation, and energy development projects within 10 miles of the Project. This includes natural gas well permitting and development projects;
- major actions within watersheds that would be crossed by the Project; and
- actions with potential to result in long-term impacts on air quality (for example, natural gas pipeline compressor stations) located within an AQCR crossed by the Project.

We received comments concerning the development of natural gas reserves in the Marcellus Shale. Development of the Marcellus Shale natural gas resource is not the subject of the EIS nor is the issue directly related to the Project. Production and gathering activities, and the pipelines and facilities used for these activities, are not regulated by FERC but are overseen by the affected region's state and local agencies with jurisdiction over the management and extraction of the Marcellus Shale gas resource. FERC's jurisdiction is further restricted to facilities used for the transportation of natural gas in interstate commerce, and does not typically extend to facilities used for intrastate transportation.

We also received several comments about potential cumulative impacts relative to safety between the Project and collocated pipelines. Based on the construction and design methods of pipelines collocated within a shared right-of-way and adherence to DOT safety regulations, it is unlikely that one pipeline failure would cause the adjacent pipeline to also fail. As previously described, the Project would be designed and constructed in accordance with or in exceedance of the DOT's Minimum Federal Safety Standards and to meet requirements established for protection of metallic facilities from external, internal, and atmospheric corrosion.

A majority of the impacts associated with the Project in combination with other projects such as residential developments, utility lines, and transportation projects, would be temporary and relatively minor overall. However, some long-term cumulative impacts would occur on wetland and forested vegetation and associated wildlife habitats. Water resources could potentially be negatively impacted by arsenic released by blasting activities associated with multiple projects. Some long-term cumulative benefits to the community would be realized from the increased tax revenues. Short-term cumulative benefits would also be realized through jobs and wages and purchases of goods and materials. Emissions associated with the Project would contribute to cumulative air quality impacts. There is also the potential, however, that the Project would contribute to a cumulative improvement in regional air quality if a portion of the natural gas associated with the Project displaces the use of other more polluting fossil fuels. With implementation of specialized construction techniques, the relatively short construction timeframe in any one location, and carefully developed resource protection and mitigation plans designed to minimize and control environmental impacts for the Project as a whole, we conclude that the cumulative impacts associated with the Project, when combined with other known or reasonably foreseeable projects, would be effectively limited.

5.1.13 Alternatives

As an alternative to the proposed action, we evaluated the no-action alternative, energy alternatives, and system alternatives. We also evaluated pipeline routing alternatives and an alternative compressor station location.

While the no-action alternative would eliminate the short- and long-term environmental impacts identified in the EIS, the stated objectives of PennEast's proposal would not be met. We evaluated the use of alternative energy sources and the potential effects of energy conservation, but these measures similarly would not satisfy the objectives of the Project, provide an equivalent supply of energy, or meet the demands of the Project Shippers.

Our analysis of system alternatives included an evaluation of whether existing or proposed natural gas pipeline systems could meet PennEast's objectives while offering an environmental advantage. There is no available capacity for existing pipeline systems to transport the required volumes of natural gas to the range of delivery points proposed by PennEast. Moreover, with the exception of the Transco Leidy Line, none of these existing pipeline systems are in close proximity to the production areas of northern Pennsylvania. We determined that an expansion of the existing Transco Leidy Line as an alternative would not be feasible due to densely populated areas along the line that would prevent looping. Expansion of the Transco Leidy Line would also not provide access to the delivery points proposed by PennEast. Other existing systems in the area of the Project would require significant expansions to meet the objectives of the Project, which would result in environmental impacts similar to or greater than the Project.

We evaluated whether an expansion of the proposed Atlantic Sunrise Project could serve as a system alternative. Approximately 100 percent of capacity for the Atlantic Sunrise Project, and 90 percent for the PennEast Project, has been contracted, therefore, there is customer demand for both projects. The Atlantic Sunrise Project would also not provide for the same delivery points for customers that have been identified for the PennEast Project. Consequently, there are no practicable existing or proposed system alternatives that are environmentally preferable to the Project.

We evaluated four major route alternatives to the proposed pipeline route. Because none of these would offer major environmental advantages over the proposed pipeline route, we do not consider the route alternatives to be preferable to the proposed route. We evaluated 83 route variations that were identified by PennEast or suggested by landowners, municipalities, and other stakeholders. The variations were identified to avoid or reduce effects on environmental or other resources at specific locations, resolve engineering or constructability issues, address specific landowner requests, or address other stakeholder concerns. Of the 83 variations, PennEast has incorporated 39 into the proposed route. We have reviewed the route variations and agree with PennEast's conclusions regarding incorporation of the 39 route variations into the proposed route.

PennEast proposes to construct one new compressor station, the Kidder Compressor Station, in Carbon County, Pennsylvania. We evaluated one alternative site for the compressor station and do not consider the alternative site to be preferable to the proposed Kidder Compressor Station site. We also evaluated the feasibility of installing electric motor driven compressor units at the Kidder Compressor Station instead of the proposed natural gas-fired compressor turbines. We found that this alternative would result in higher overall emissions due to emissions created by generation of the needed electricity, and this alternative would result in additional impacts from construction of the needed electric transmission service to the site. We do not consider electric motor driven compressor units to be preferable to the proposed natural gas-fired compressor turbines.

5.2 FERC STAFF'S RECOMMENDED MITIGATION

If the Commission authorizes the PennEast Pipeline Project, we recommend that the following measures be included as specific conditions in the Commission's Order. We believe that these measures would further mitigate the environmental impact associated with construction and operation of the Project. We do not believe that PennEast's responses to those conditions that are requested prior to the end of the draft EIS comment period would change any of the conclusions presented in the draft EIS. Instead the requested information is primarily related to ensuring that our final EIS is complete with up to date information on PennEast's ongoing efforts to minimize the impacts of the Project and comply with FERC regulations.

1. PennEast shall follow the construction procedures and mitigation measures described in its application and supplements (including responses to staff data requests) and as identified in the EIS, unless modified by the Order. PennEast must:

    a) request any modification to these procedures, measures, or conditions in a filing with the Secretary;
    b) justify each modification relative to site-specific conditions;
    c) explain how that modification provides an equal or greater level of environmental protection than the original measure; and
    d) receive approval in writing from the Director of the OEP **before using that modification**.

2. The Director of the OEP has delegated authority to take whatever steps are necessary to ensure the protection of all environmental resources during construction and operation of the Project. This authority shall allow:

   a) the modification of conditions of the Order; and
   b) the design and implementation of any additional measures deemed necessary (including stop-work authority) to assure continued compliance with the intent of the environmental conditions as well as the avoidance or mitigation of adverse environmental impact resulting from Project construction (and operation).

3. **Prior to any construction**, PennEast shall file an affirmative statement with the Secretary, certified by a senior company official, that all company personnel, EIs, and contractor personnel will be informed of the EIs' authority and have been or will be trained on the implementation of the environmental mitigation measures appropriate to their jobs before becoming involved with construction and restoration activities.

4. The authorized facility location(s) shall be as shown in the EIS, as supplemented by filed alignment sheets. **As soon as they are available**, **and before the start of construction**, PennEast shall file with the Secretary any revised detailed survey alignment maps/sheets at a scale not smaller than 1:6,000 with station positions for all facilities approved by the Order. All requests for modifications of environmental conditions of the Order or site-specific clearances must be written and must reference locations designated on these alignment maps/sheets.

   PennEast's exercise of eminent domain authority granted under NGA section 7(h) in any condemnation proceedings related to the Order must be consistent with these authorized facilities and locations. PennEast's right of eminent domain granted under NGA section 7(h) does not authorize it to increase the size of its natural gas facilities to accommodate future needs or to acquire a right-of-way for a pipeline to transport a commodity other than natural gas.

5. PennEast shall file with the Secretary detailed alignment maps/sheets and aerial photographs at a scale not smaller than 1:6,000 identifying all route realignments or facility relocations, and staging areas, pipe storage-yards, new access roads, and other areas that will be used or disturbed and have not been previously identified in filings with the Secretary. Approval for each of these areas must be explicitly requested in writing. For each area, the request must include a description of the existing land use/cover type, documentation of landowner approval, whether any cultural resources or federally listed threatened or endangered species will be affected, and whether any other environmentally sensitive areas are within or abutting the area. All areas shall be clearly identified on the maps/sheets/aerial photographs. Each area must be approved in writing by the Director of the OEP **before construction in or near that area**.

   This requirement does not apply to extra workspace allowed by PennEast's E&SCP Plan and/or minor field realignments per landowner needs and requirements that do not affect other landowners or sensitive environmental areas such as wetlands. Examples of alterations requiring approval include all route realignments and facility location changes resulting from:

a) implementation of cultural resources mitigation measures;
b) implementation of endangered, threatened, or special concern species mitigation measures;
c) recommendations by state regulatory authorities; and
d) agreements with individual landowners that affect other landowners or could affect sensitive environmental areas.

6. **Within 60 days of the acceptance of the Certificate and before construction begins**, PennEast shall file an Implementation Plan with the Secretary for review and written approval by the Director of the OEP. PennEast must file revisions to the plan as schedules change. The plan shall identify:

a) how PennEast will implement the construction procedures and mitigation measures described in its application and supplements (including responses to staff data requests), identified in the EIS, and required by the Order;
b) how PennEast will incorporate these requirements into the contract bid documents, construction contracts (especially penalty clauses and specifications), and construction drawings so that the mitigation required at each site is clear to on-site construction and inspection personnel;
c) the number of EIs assigned per spread, and how the company will ensure that sufficient personnel are available to implement the environmental mitigation;
d) company personnel, including EIs and contractors, who will receive copies of the appropriate material;
e) the location and dates of the environmental compliance training and instructions PennEast will give to all personnel involved with construction and restoration (initial and refresher training as the Project progresses and personnel change), with the opportunity for OEP staff to participate in the training session(s);
f) the company personnel (if known) and specific portion of PennEast's organization having responsibility for compliance;
g) the procedures (including use of contract penalties) PennEast will follow if noncompliance occurs; and
h) for each discrete facility, a Gantt or PERT chart (or similar project scheduling diagram), and dates for:
   i) the completion of all required surveys and reports;
   ii) the environmental compliance training of on-site personnel;
   iii) the start of construction; and
   iv) the start and completion of restoration.

7. PennEast shall employ a team of EIs (i.e., two or more or as may be established by the Director of the OEP) per construction spread. The EI(s) shall be:

   a) responsible for monitoring and ensuring compliance with all mitigation measures required by the Order and other grants, permits, certificates, or other authorizing documents;
   b) responsible for evaluating the construction contractor's implementation of the environmental mitigation measures required in the contract (see condition 6 above) and any other authorizing document;
   c) empowered to order correction of acts that violate the environmental conditions of the Order, and any other authorizing document;
   d) a full-time position, separate from all other activity inspectors;
   e) responsible for documenting compliance with the environmental conditions of the Order, as well as any environmental conditions/permit requirements imposed by other federal, state, or local agencies; and
   f) responsible for maintaining status reports.

8. **Beginning with the filing of its Implementation Plan**, PennEast shall file updated status reports with the Secretary on a **weekly basis** until all construction and restoration activities are complete. On request, these status reports would also be provided to other federal and state agencies with permitting responsibilities. Status reports shall include:

   a) an update on PennEast's efforts to obtain the necessary federal authorizations;
   b) the construction status of each spread, work planned for the following reporting period, and any schedule changes for stream crossings or work in other environmentally sensitive areas;
   c) a listing of all problems encountered and each instance of noncompliance observed by the EIs during the reporting period (both for the conditions imposed by the Commission and any environmental conditions/permit requirements imposed by other federal, state, or local agencies);
   d) a description of the corrective actions implemented in response to all instances of noncompliance, and their cost;
   e) the effectiveness of all corrective actions implemented;
   f) a description of any landowner/resident complaints that may relate to compliance with the requirements of the Order, and the measures taken to satisfy their concerns; and
   g) copies of any correspondence received by PennEast from other federal, state, or local permitting agencies concerning instances of noncompliance, and PennEast's response.

9. PennEast shall develop and implement an environmental complaint resolution procedure. The procedure shall provide landowners with clear and simple directions for identifying and resolving their environmental mitigation problems/concerns during construction of the

Project and restoration of the right-of-way. **Prior to construction**, PennEast shall mail the complaint procedures to each landowner whose property would be crossed by the Project.

a) In its letter to affected landowners, PennEast shall:
   i) provide a local contact that the landowners should call first with their concerns; the letter should indicate how soon a landowner should expect a response;
   ii) instruct the landowners that if they are not satisfied with the response, they should call PennEast's Hotline; the letter should indicate how soon to expect a response; and
   iii) instruct the landowners that if they are still not satisfied with the response from PennEast's Hotline, they should contact the Commission’s Landowner Helpline at 877-337-2237 or at LandownerHelp@ferc.gov.

b) In addition, PennEast shall include in its weekly status report a copy of a table that contains the following information for each problem/concern:
   i) the identity of the caller and date of the call;
   ii) the location by milepost and identification number from the authorized alignment sheet(s) of the affected property;
   iii) a description of the problem/concern; and
   iv) an explanation of how and when the problem was resolved, will be resolved, or why it has not been resolved. *(Section 4.7.3.1)*

10. **Prior to receiving written authorization from the Director of the OEP to commence construction of any Project facilities**, PennEast shall file with the Secretary documentation that it has received all applicable authorizations required under federal law (or evidence of waiver thereof).

11. PennEast must receive written authorization from the Director of the OEP **before placing the Project into service**. Such authorization will only be granted following a determination that rehabilitation and restoration of the right-of-way and other areas affected by the Project are proceeding satisfactorily.

12. **Within 30 days of placing the authorized facilities in service**, PennEast shall file an affirmative statement with the Secretary, certified by a senior company official:

    a) that the facilities have been constructed in compliance with all applicable conditions, and that continuing activities will be consistent with all applicable conditions; or
    b) identifying which of the Certificate conditions PennEast has complied with or will comply with. This statement shall also identify any areas affected by the Project where compliance measures were not properly implemented, if not previously identified in filed status reports, and the reason for noncompliance.

13. **Prior to construction**, PennEast shall file with the Secretary results of the outstanding Phase 2 and 3 portions of the Geohazard Risk Evaluation Report and include the following in its pipeline design geotechnical report:

    a) an evaluation of liquefaction hazards along the pipeline route and at the proposed compressor station site;
    b) a final landslide hazard inventory;
    c) any specific measures and locations where specialized pipeline design will be implemented to mitigate for potential liquefaction or landslide hazards; and
    d) a post-construction monitoring plan. *(Section 4.1.5.2)*

14. **Prior to construction**, PennEast shall file with the Secretary a final Karst Mitigation Plan that incorporates the results of all outstanding geophysical and geotechnical field investigations in karst areas including stream crossings proposed with the HDD method. *(Section 4.1.5.4)*

15. **Prior to the end of the draft EIS comment period**, PennEast shall file with the Secretary the results of its ongoing evaluation of potential presence of working and abandoned mines near the proposed crossing of the Susquehanna River. The evaluation shall include documentation of coordination with the Pennsylvania Bureau of Abandoned Mine Reclamation, and shall identify any specific design or mitigation measures. *(Section 4.1.5.4)*

16. **Prior to construction,** PennEast shall file with the Secretary the results of all outstanding geotechnical investigations and final planned design of each HDD crossing. *(Section 4.1.7)*

17. **Prior to construction**, PennEast shall complete all necessary surveys for water supply wells and groundwater seeps and springs, identify public and private water supply wells within the construction workspace, and file with the Secretary a revised list of water wells and groundwater seeps and springs within 150 feet of any construction workspace (500 feet in areas characterized by karst terrain). *(Section 4.3.1.5)*

18. **Prior to construction**, PennEast shall file with the Secretary an updated Unanticipated Discovery of Contamination Plan for the Project to identify the management and field environmental professionals responsible for notification for contaminated sites. *(Section 4.3.1.7)*

19. **Prior to the end of the draft EIS comment period**, PennEast shall file with the Secretary documentation to identify any special construction procedures that will be implemented to minimize impacts on C-1 streams. PennEast shall provide documentation of consultation with appropriate federal and state agencies regarding C-1 streams, including identification of any agency recommendations and PennEast's responses. *(Section 4.3.2.2)*

20. **Prior to the end of the draft EIS comment period**, PennEast shall file with the Secretary proposed crossing methods for all waterbodies, including those with contaminated sediments. The proposed method shall ensure that the potential suspension of sediments during construction shall be avoided or minimized to the greatest extent possible so as not to change bioavailability of any potential contaminants present. PennEast shall include

documentation of consultation with pertinent agencies and identify any recommended minimization measures. *(Section 4.3.2.2)*

21. **Prior to construction**, PennEast shall file a revised E&SCP with the Secretary for review and approval by the Director of the OEP, and PennEast shall complete its review of waterbody crossings with steep slopes and modify its Project-specific E&SCP as necessary to address waterbody crossing methods for steep embankments and bank stabilization issues, and include measures to address erosion, sedimentation, and restoration of steep embankments. *(Section 4.3.2.2)*

22. **Prior to construction**, PennEast shall file with the Secretary its final hydrostatic test plan that identifies the final hydrostatic test water sources and discharge locations, and provides documentation that all necessary permits and approvals have been obtained for withdrawal from each source. PennEast's plan shall provide the approximate water volume that will be withdrawn and discharged as both a Project-total amount, and a daily amount, for each pipeline segment. Also, PennEast's plan shall detail the decision process for determining when an alternative water source will be used during exceptional dry periods when low flow conditions may be encountered. *(Section 4.3.2.5)*

23. **Prior to construction,** PennEast shall file with the Secretary documentation after consulting with appropriate local, state, and federal agencies regarding any in-water timing restrictions which are more restrictive than those required by the FERC Procedures (e.g., June 1 through September 30 to protect coldwater fisheries; and June 1 through November 30 to protect coolwater and warmwater fisheries). *(Section 4.3.3.2)*

24. **Prior to construction**, PennEast shall file with the Secretary a complete wetland delineation report for the entire Project that includes all wetlands delineated in accordance with the USACE and the applicable state agency requirements. *(Section 4.4.1)*

25. **Prior to construction**, PennEast shall survey all areas mapped as being potential vernal habitat and identify whether these areas contain vernal pool habitat that will be affected by the proposed alignment during construction or operation. The results of these surveys shall be filed with the Secretary and the appropriate state agencies for review. *(Section 4.4.1.2)*

26. **Prior to the end of the draft EIS comment period,** PennEast shall file with the Secretary the special construction methods that it will implement during construction in extremely saturated wetlands. If additional workspace is required at the saturated wetlands along the pipeline alignment, PennEast shall identify these in a table and provide site-specific justification for the additional workspace. *(Section 4.4.2)*

27. **Prior to construction**, PennEast shall finalize a Project-specific Wetland Restoration Plan in consultation with the USACE and applicable state agencies in Pennsylvania and New Jersey, and file the plan with the Secretary. PennEast shall provide documentation of its consultation with the applicable federal and state agencies. *(Section 4.4.2)*

28. **Prior to construction,** PennEast shall modify its proposal to exclude the use of forested areas as pipe storage-yards. *(Section 4.5.1.2)*

29. **Prior to construction**, PennEast shall develop a New Jersey No-Net Loss Reforestation Act Plan for the parcels identified in table 4.5.1-2 of the EIS, in coordination with NJDEP and file the plan with the Secretary. *(Section 4.5.1.2)*

30. **Prior to the construction**, PennEast shall develop an Invasive Species Management Plan in consultation with appropriate state agencies that includes measures it will implement during construction and operation to minimize the spread of invasive and noxious plant species along with documentation of consultation with the relevant agencies. *(Section 4.5.1.2)*

31. **Prior to construction,** PennEast shall file with the Secretary a Migratory Bird Conservation Plan developed in consultation with the FWS, along with documentation of consultation with the FWS. *(Section 4.5.2.3)*

32. **Prior to the end of the draft EIS comment period,** PennEast shall file with the Secretary the measures or changes that it will implement to the Project's design in order to ensure that the Project is consistent with the FWS requirement to avoid all bat hibernacula by at least 0.25 mile. PennEast shall also provide documentation of the consultation with the FWS on this restriction. *(Section 4.6.1.1)*

33. **Prior to construction**, PennEast shall file with the Secretary a list of locations by MP where the FWS would require tree clearing restrictions that are specifically applicable to federally listed bat species. *(Section 4.6.1.1)*

34. **Prior to construction**, PennEast shall file with the Secretary a bog turtle plan developed in coordination with the FWS that includes avoidance, minimization, and mitigation measures to minimize impact on bog turtles and their habitat, and describes measures that will be used during construction and operation to avoid direct and indirect impacts on bog turtles. *(Section 4.6.1.2)*

35. **Prior to construction**, PennEast shall consult with the FWS and NJDEP in order to determine the need for targeted mussel surveys at the currently inaccessible crossings of the tributaries to the Delaware River that have the potential to support the dwarf wedgemussel. PennEast shall file with the Secretary documentation of this consultation with the FWS and NJDEP, as well as any recommendations made by the FWS and NJDEP. *(Section 4.6.1.3)*

36. **Prior to construction**, PennEast shall file with the Secretary the results of additional surveys to determine potential presence of northeastern bulrush. If the northeastern bulrush is identified within the proposed construction work area, PennEast shall identify the specific measures that it will use to avoid impacts within 300 feet of wetlands or 150 feet of waterways where the species is found. PennEast shall also provide documentation of the consultation with the FWS. If PennEast is unable to adhere to its proposed 300-foot no disturbance buffer around wetlands and 150-foot no disturbance buffer around any waterways that support the northeastern bulrush, then the affected wetland shall be crossed via a HDD method. *(Section 4.6.1.4)*

37. **Prior to construction**, PennEast shall complete all necessary surveys for federally listed species and shall file with the Secretary all survey results, including any comments

received from the FWS on the surveys and their conclusions. The survey reports shall include:

a) name(s) and qualifications of the person(s) conducting the survey;
b) method(s) used to conduct the survey;
c) date(s) of the survey;
d) area surveyed (include the mileposts surveyed); and
e) proposed mitigation that would substantially avoid or minimize the potential impacts. *(Section 4.6.1.6)*

38. PennEast shall not construct or use any of its facilities, including related ancillary areas for staging, storage, temporary work areas, and new or to-be-improved access roads, **until**:

    a) the Commission staff completes formal ESA consultations with the FWS; and
    b) PennEast has received written notification from the Director of the OEP that construction and/or implementation of conservation measures may begin. *(Section 4.6.1.6)*

39. **Prior to construction**, PennEast shall file with the Secretary a comprehensive list of measures developed in consultation with applicable state wildlife agencies to avoid or mitigate impacts on state-listed species and state species of concern, which shall include but not be limited to measures applicable to the eastern small-footed bat, timber rattlesnake, eastern box turtle, northern cricket frog, long-tailed salamander, and Cobblestone tiger beetle. *(Section 4.6.2.25)*

40. **Prior to construction**, PennEast shall file with the Secretary its final Traffic Management Plan, developed in conjunction with local public transportation and safety officials along the Project pipeline route. *(Section 4.7.1.6)*

41. **Prior to construction**, PennEast shall file with the Secretary, for review and written approval by the Director of the OEP:

    a) the results of previously unsurveyed areas along the pipeline route and an updated list of residences and commercial structures within 50 feet of the construction right-of-way;
    b) for all residences identified within 25 feet of a construction work area, a final site-specific construction plan that includes all of the following: a dimensioned site plan that clearly shows the location of the residence in relation to the pipeline, the boundaries of all construction work areas, the distance between the edge of construction work areas and the residence and other permanent structures, and equipment travel lanes;
    c) a description of how and when landowners will be notified of construction activities;
    d) documentation of landowner concurrence if a structure within the construction work area will be relocated or purchased; and
    e) documentation of landowner concurrence if the construction work areas will be within 10 feet of a residence. *(Section 4.7.3.1)*

42. **Prior to the end of the draft EIS comment period**, PennEast shall file with the Secretary any route adjustments, workspace modifications, or mitigation measures developed through PennEast's ongoing consultations with landowners regarding the following planned and/or pending projects:

    a) Fields at Trio Farms Subdivision;
    b) Huntington Knolls, LLC Housing Development; and
    c) Hopewell Township Emergency Services Facility.

    PennEast shall provide documentation of correspondence with these landowners. PennEast shall either incorporate these deviations or a route that avoids the resources of concern, or otherwise explain how potential impacts on resources have been effectively avoided, minimized, or mitigated. *(Section 4.7.3.2)*

43. **Prior to the end of the draft EIS comment period**, PennEast shall file with the Secretary an update of the status of the development of the site-specific crossing plans for each of the recreation and special interest areas listed as crossed by the Project or otherwise affected in appendix G-14. The site-specific crossing plans shall include, as applicable:

    a) site-specific timing restrictions;
    b) proposed closure details and notifications (e.g., reroutes, signage, public notices);
    c) specific safety measures; and/or
    d) other mitigation to be implemented to minimize effects on the recreation areas and their users during construction and operation of the Project. *(Section 4.7.5)*

44. **Prior to construction**, PennEast shall file with the Secretary, for review and written approval of the Director of the OEP, plans regarding a gating or boulder access system for the pipeline right-of-way across state lands, developed in consultation with PADCNR, to prevent unauthorized vehicle access while maintaining pedestrian traffic. *(Section 4.7.5.2)*

45. **Prior to the end of the draft EIS comment period,** PennEast shall file with the Secretary documentation of USDA approval for construction and operation of the Project within any and all parcels affected that have active USDA conservation easements. Alternatively, PennEast shall identify any Project changes made to avoid parcels with USDA conservation easements, and include documentation of consultation with the USDA that confirms avoidance of USDA conservation easements. *(Section 4.7.5.4)*

46. **Prior to construction**, PennEast shall assess potential Project impacts on the Hickory Run Recreation Demonstration Area and file with the Secretary, for review and written approval by the Director of the OEP, a recommendation of effects and the Pennsylvania SHPO's comments. *(Section 4.9.2.1)*

47. **Prior to construction**, PennEast shall file with the Secretary, for review and written approval by the Director of the OEP, a final vibration monitoring plan for historic properties within 150 feet of the construction workspace in consultation with the Pennsylvania and New Jersey SHPOs. *(Section 4.9.5)*

48. **Prior to construction**, PennEast shall file with the Secretary, for review and written approval by the Director of the OEP, a revised Blasting Plan that includes a review of potential effects on cultural resources, including caves, rockshelters, and aboveground historic structures, and how those impacts will be addressed. *(Section 4.9.5)*

49. PennEast **shall not begin construction** of facilities and/or use of all staging, storage, or temporary work areas, and new or to-be-improved access roads **until**:

    a) PennEast files with the Secretary:
        i) remaining cultural resources survey report(s);
        ii) site evaluation report(s) and avoidance/treatment plan(s), as required;
        iii) the Project's recommended effects to historic properties in Pennsylvania and New Jersey; and
        iv) comments on the cultural resources reports and plans from the Pennsylvania and New Jersey SHPOs, as appropriate;

    b) the Advisory Council on Historic Preservation is afforded an opportunity to comment if historic properties will be adversely affected; and

    c) the FERC staff reviews and the Director of the OEP approves the cultural resources reports and plans, and notifies PennEast in writing that treatment plans/mitigation measures (including archaeological data recovery) may be implemented and/or construction may proceed.

    All materials filed with the Commission containing location, character, and ownership information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: "**CONTAINS PRIVILEGED INFORMATION - DO NOT RELEASE**." *(Section 4.9.6)*

50. If changes to the Project construction schedule occur that will materially impact the amount of NO_X emissions generated in a calendar year, PennEast shall file with the Secretary, **in PennEast's weekly status report,** revised construction emissions estimates prior to implementing the schedule modification demonstrating that the annual NO_X emissions resulting from the revised construction schedule do not exceed general conformity applicability thresholds. *(Section 4.10.1.3)*

51. **Prior to construction**, PennEast shall file with the Secretary, for review and written approval by the Director of the OEP, a HDD noise mitigation plan to reduce the projected noise level attributable to the proposed drilling operations at the 18 NSAs with predicted noise levels above 55 dBA L_{dn}. During drilling operations, PennEast shall implement the approved plan, monitor noise levels, include the noise monitoring results in its **weekly** status reports, and make all reasonable efforts to restrict the noise attributable to the drilling operations to no more than 55 dBA L_{dn} at the NSAs. *(Section 4.10.2.3)*

52. PennEast shall file a noise survey with the Secretary **no later than 60 days after placing the Kidder Compressor Station in service**. If a full load noise condition survey is not possible, PennEast shall provide an interim survey at the maximum horsepower load and provide the full load survey **within six months**. If the noise attributable to the operation

of the compressor station at full load exceeds an L_{dn} of 55 dBA at any nearby NSA, PennEast shall file a report on what changes are needed and shall install the additional noise controls to meet the level **within one year of the in-service date.** PennEast shall confirm compliance with the above requirement by filing a second noise survey with the Secretary **no later than 60 days after it installs the additional noise controls.** *(Section 4.10.2.3)*

53. **Prior to the end of the draft EIS comment period,** PennEast shall file with the Secretary proposed mitigation measures to minimize noise levels associated with emergency or maintenance MLV blowdown events. Mitigation measures may include but not be limited to use of a silencer, restricting maintenance blowdowns to daytime hours only, and/or notifying landowners in the immediate area of the planned blowdown event. *(Section 4.10.2.3)*

54. **Prior to the end of the draft EIS comment period,** PennEast shall file with the Secretary a complete noise analysis of the Project metering (interconnect) stations using the best available typical design or vendor specification with regards to impacts on the closest identified residences/NSA as shown in table 4.10.2-10. *(Section 4.10.2.3)*

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